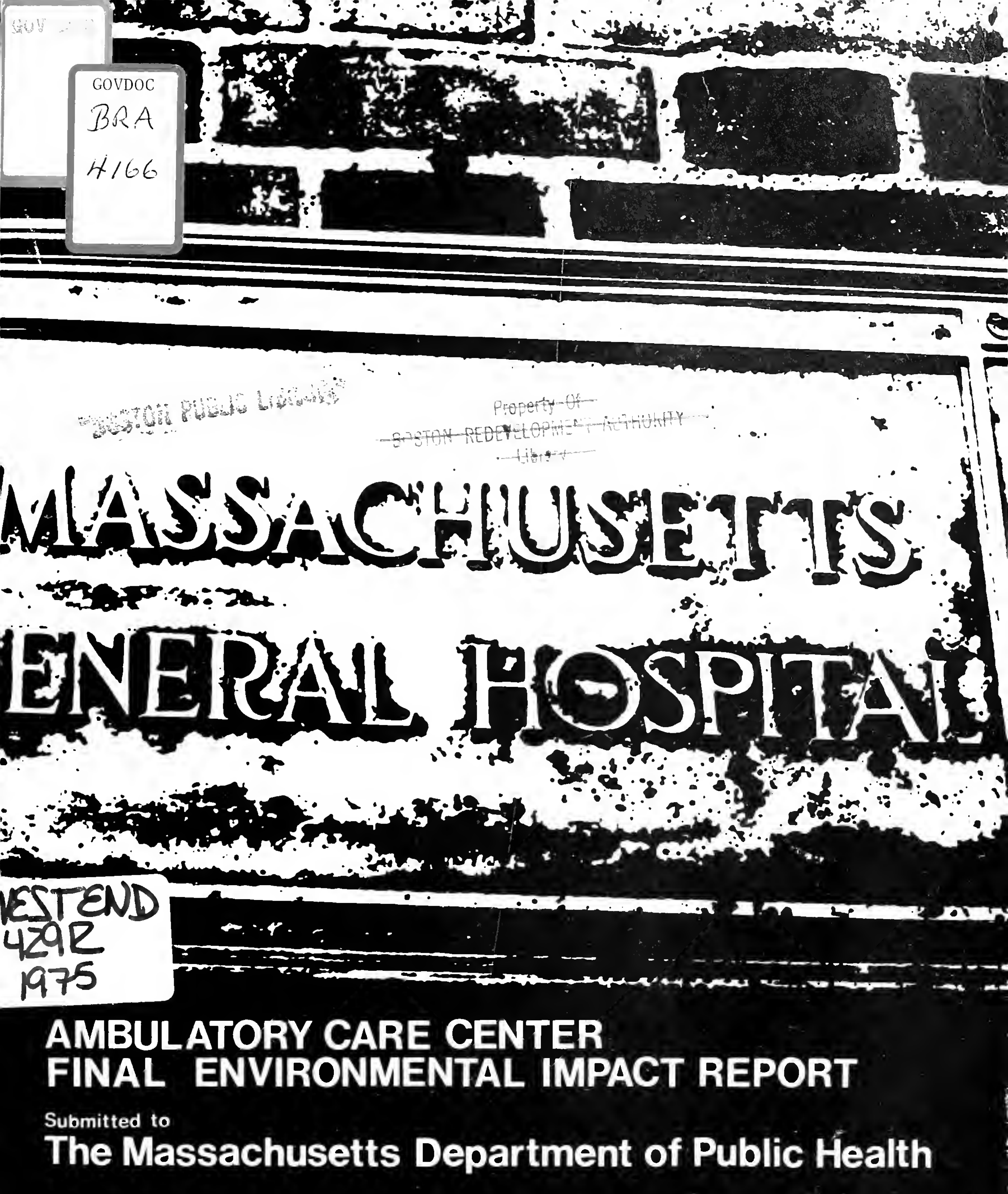




# AMBULATORY CARE CENTER
# FINAL ENVIRONMENTAL IMPACT REPORT

Submitted to

**The Massachusetts Department of Public Health**

Submitted by

**The Massachusetts General Hospital and
The Cambridge Street Community
Development Corporation**

# FINAL ENVIRONMENTAL IMPACT REPORT

# FOR THE

# MASSACHUSETTS GENERAL HOSPITAL

# AMBULATORY CARE CENTER

Prepared for:

Massachusetts Department of Public Health

Certificate of Need Program

DPH No. 6-2434

EOEA No. 01273

Prepared by:

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June 30, 1975

NOTICE OF COMMENTS

Comments on this draft environmental impact report are encouraged. Please direct your comments, preferably in writing to Ms. Jane Kreamer, Department of Public Health, 80 Boylston Street, Room 925, Boston, Massachusetts 727-6274. All comments should be submitted within 30 days of the publication of this report, or by May 12, 1975.

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<u>Introduction</u>

In accordance with the Executive Office of Environmental Affairs (EOEA) guidelines for preparing impact statements, Chapter I consists of the environmental assessment form completed by the Massachusetts Department of Health, Certificate of Need Program, and submitted to EOEA on November 15, 1974.

# APPENDIX A

## ENVIRONMENTAL ASSESSMENT FORM

This form is provided to assist you in determining whether a proposed project could cause significant environmental damage and thus require an environmental impact report.

EXECUTIVE OFFICE Human Services DEPARTMENT Public Health

DIVISION Health Facilities Development OTHER

PROJECT IDENTIFICATION Mass. General Hospital - Ambulatory Care Center

PREDICTED DATES: Commencement late 1975 Completion 1978

PROJECTED COST $25,000,000.00

I. Background Information

1. Give a brief description of the proposed projects(s), and describe how your agency is involved in the project.

   This agency is charged with the responsibility of reviewing applications from health care facilities for a determination of need under G.L. ch. 111, s. 25C., and of making recommendations to the Public Health Council for action.

   The Massachusetts General Hospital proposes the construction of a 359,000 square foot, 14 level (two below grade) Ambulatory Care Clinic which will consolidate, but not expand, existing ambulatory care clinics and doctor's offices in order to provide for more efficient delivery of services.

2. Describe the geographical area or areas which will be affected by the project(s), including distinguishing natural and man-made characteristics, and a brief description of the present use of the area or areas.

   The Center will be built on the main campus of the Hospital at the Fruit Street location. It will be located on North Grove Street on the site of the present Moseley and Wolcott buildings which will be demolished. The area is zoned for hospital use.

## II. Assessment of Environmental Damage

Answer the following questions by placing a check in the appropriate space; consider both short and long term damage. Wherever "No" is checked, indicate on the lines below the question why there will be no significant damage.

| Question | Short Term Yes | Short Term No | Long Term Yes | Long Term No |
|---|---|---|---|---|
| 1. Could the project(s) affect the use of a recreational area or area of important aesthetic value? | | x | | x |
| 2. Are any of the natural or man-made features in affected area(s) unique; that is, not found in other parts of the Commonwealth or nation? | | x | | x |
| 3. Could the project(s) affect an historical or archaeological structure or site? | | x | | x |
| 4. Could the project(s) affect the potential use, extraction, or conservation of a scarce natural resource? | | x | | x |
| 5. Does the project(s) area serve as a habitat, food source, nesting place, source of water, etc. for rare or endangered wildlife or fish species? | | x | | x |
| 6. Could the project(s) affect fish, wildlife, or plant life? | | x | | x |

1. (no explanation given)

2. The site contains 2 MGH owned buildings neither of which are unique structures.

3. The building is in proximity to the historic Bullfinch building. The completed construction will provide a larger more sympathetic landscaped setting for this historic building including restoration of the historic view from the top of Anderson St. to the Bullfinch building.

4. The project area is an urban site with no known reserves of natural resources.

5. The project area is an urban site and does not serve any function for either wildlife or fish.

6. Given the project's urban location surrounded by high density development, it is unlikely that it could effect fish, wildlife or plantlife.

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| | Short Term Yes | Short Term No | Long Term Yes | Long Term No |
|---|---|---|---|---|
| 7. Are there any rare or endangered plant species in the affected area(s)? | | x | | x |
| 8. Could the project(s) change existing features of any of the Commonwealth's fresh or salt waters or wetlands? | | x | | x |
| 9. Could the project(s) change existing features of any of the Commonwealth's beaches? | | x | | x |
| 10. Could the project(s) result in the elimination of land presently utilized for agricultural purposes? | | x | | x |
| 11. Will the project(s) require a variance from, or result in a violation of, any statute, ordinance, by-law, regulation or standard, the major purpose of which is to prevent or minimize damage to the environment? | | x | | x |
| 12. Will the project(s) require certification, authorization or issuance of a permit by any local, state or federal environmental control agency? | | x | | x |

7. Are there any rare or endangered plant species in the affected area(s)?

There is very little vegetation within the project area.

8. Could the project(s) change existing features of any of the Commonwealth's fresh or salt waters or wetlands?

The project area is not located on or near any of the Commonwealth's fresh or salt waters or wetlands.

9. Could the project(s) change existing features of any of the Commonwealth's beaches?

The project area is not located on or near any of the Commonwealth's beaches.

10. Could the project(s) result in the elimination of land presently utilized for agricultural purposes?

None of the project area is presently being utilized for agricultural purposes since it is an urban site, already developed.

11. Will the project(s) require a variance from, or result in a violation of, any statute, ordinance, by-law, regulation or standard, the major purpose of which is to prevent or minimize damage to the environment?

Some variances of zoning regulations may be required

12. Will the project(s) require certification, authorization or issuance of a permit by any local, state or federal environmental control agency?

| | Short Term Yes | Short Term No | Long Term Yes | Long Term No |
|---|---|---|---|---|
| 13. Will the project(s) involve the application, use or disposal of potentially hazardous materials? | | x | x | |

Radiological materials necessary for laboratory work will be used, in strict accordance with present regulations regarding their use.

| | Short Term Yes | Short Term No | Long Term Yes | Long Term No |
|---|---|---|---|---|
| 14. Will the project(s) involve construction of facilities in a flood plain? | | x | | x |

The project is not located on or near a flood plain.

| | Short Term Yes | Short Term No | Long Term Yes | Long Term No |
|---|---|---|---|---|
| 15. Could the project(s) result in the generation of significant amounts of noise? | x | | | x |

Noise will be generated both during demolition and construction, but every effort will be made to diminish the levels of such noise.

| | Short Term Yes | Short Term No | Long Term Yes | Long Term No |
|---|---|---|---|---|
| 16. Could the project(s) result in the generation of significant amounts of dust? | x | | | x |

Dust will be generated during the period of demolition, but appropriate controls will be taken.

| | Short Term Yes | Short Term No | Long Term Yes | Long Term No |
|---|---|---|---|---|
| 17. Will the project(s) involve the burning of brush, trees, construction materials, etc.? | | x | | x |

No burning will occur.

| | Short Term Yes | Short Term No | Long Term Yes | Long Term No |
|---|---|---|---|---|
| 18. Could the project(s) result in a deleterious effect on the quality of any portion of the state's air or water resources? (If yes, indicate whether surface, ground water, offshore) | | x | | x |

There are no known water reserves on the site. There may be some deleterious effect on the air and atmosphere from pollution.

| | Short Term Yes | Short Term No | Long Term Yes | Long Term No |
|---|---|---|---|---|
| 19. Could the project(s) affect an area of important scenic value? | | x | x | |
| 20. Will the project result in any form of environmental damage not included in the above questions? | | x | | x |

Answer to 19: It will restore and enhance the setting of the historical Bullfinch building.

## III. Statement of No Significant Environmental Effects

A "yes" answer to any of the questions in Section II indicates that the project may cause significant environmental damage, and that an EIR will probably be required. If you have answered "yes" to one or more of the questions, but still think the project will cause no significant environmental damage, indicate your reasons below.

Although we feel that the impact of this project will be minimal, it does appear that there is some potential for damage which should be investigated in order to minimize any adverse effects.

IV. Conclusions

Place a check in the appropriate box.

1. ( ) It has been determined that the project will not cause significant environmental damage. No further reports will be filed.

2. (X) It has been determined that the project may cause significant environmental damage. A draft environmental impact report will be submitted on February 15, 1975 (approximate date).

The draft report will be:

3. (X) Standard 4. ( ) Extensive 5. ( ) Combined

6. Joint, in participation with ______________________, with ______________________ designated as the lead agency.

Signature of Preparing Officer ______________________

Title PROGRAM DIRECTOR

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## II - INTRODUCTION AND SUMMARY

### DESCRIPTION OF THE PROPOSED ACTION

The Massachusetts General Hospital (MGH) proposes to construct an Ambulatory Care Center (ACC) located on North Grove Street on the site of the present Moseley and Walcott buildings. The proposed center would contain approximately 350,000 square feet of space throughout 14 floors, including 12 floors above and 2 floors below ground levels. Each floor would contain a different medical specialty and be linked to the comparable inpatient specialty service in the White Building. The ACC would provide primary care (largely for West End and Beacon Hill residents) and specialty referral care for the entire Boston Metropolitan Area and the New England region.

The ACC would consolidate outpatient clinics, private MGH physicians' offices, ambulatory surgical facilities, laboratories, and other medical support activities, which are now provided at 14 separate locations, into one organizational framework and one building. Yet the ACC would not add any new health care services to those already provided by the hospital, nor would it require additional medical staff. Rather, the proposed center would serve as a means to reorganize and consolidate existing ambulatory care services to provide a single standard of high quality and cost effective ambulatory care. In addition, it would improve the efficiency of health care delivery and reduce the need for long patient waiting times and multiple return visits. Finally, the ACC would improve the quality of medical education by expanding educational programs in primary care and ambulatory referral care.

In September 1974, the MGH submitted an application to the Department of Public Health (DPH) for a Certificate of Need which, when granted, would enable the MGH to build the Ambulatory Care Center. On November 20, 1974, the Area 628 ACC subcommittee of the Health Planning Council for Greater Boston, Inc. (HPCGC) voted to "approve the ACC Certificate of Need based on their view of the information presented to them to date." Subsequently, the HPCGB Board of Directors voted on December 5, 1974 to recommend to the Public Health Council their endorsement of the Area 628 subcommittee's report.

Prior to issuing the Certificate of Need, the DPH is required - by its own environmental regulations and by those established in Chapter 30, Section 62 of the General Laws of Massachusetts - to consider the potential environmental effects of a planned hospital facility. This report, submitted in fulfillment of that requirement, is intended to inform decision-makers and the public about the probable environmental impacts of the ACC before it is approved, and to ensure that the MGH use all practical means to minimize foreseeable potential environmental damage.

The environmental team preparing the report was guided by representatives of the DPH, MGH and the Cambridge Street Community Development Corporation (CSCDC). The CSCDC was organized in 1971 by the Beacon Hill Civic Association, the Massachusetts General Hospital and the Massachusetts Eye and Ear Infirmary as a vehicle for the community cooperatively to plan for, and develop the Cambridge Street-West End area from Government Center to the Charles River. Working jointly with MGH staff, CSCDC aided in selecting the consultants for technical environmental studies, and coordinated their activities once selected. In this process, CSCDC's role was to resolve potential conflicts between the plans for the ACC and the effects of those plans on the physical and social environment, through an open participatory process. To this end CSCDC sponsored two major public meetings to discuss the report and disseminated information through newsletters and public notices.

## ORGANIZATION OF THE ENVIRONMENT IMPACT REPORT

This environmental impact report (EIR) has been organized into seven chapters and generally conforms to the "Regulations to Create a Uniform System for the Preparation of Environmental Impact Reports," filed by the Executive Office of Environmental Affairs, June 29, 1973, and the "Environmental Protection" regulations filed by the Executive Office of Human Services, February 19, 1974.

The preceding Chapter I contains a copy of the Environmental Assessment Form, while this Chapter II includes an introduction to the project and a summary of its environmental effects. In Chapter III, Description of the Ambulatory Care Center, the MGH's history of ambulatory care is presented and the ACC objectives are established. Following this discussion, the ACC is described in relation to these objectives and estimates are made of its use.

In Chapter IV, Alternatives to the Proposed Ambulatory Care Center, planning criteria are first established which serve as the basis against which three different types of options are described and evaluated: the no build and delayed build option; alternative uses for the site; and alternative sites for the ACC. Sites which have been suggested by community residents at public meetings, but which fail to meet the hospital's criteria, are also discussed in this chapter.

Chapter V, Description of the Environment, includes a general discussion of the project area and the environmental considerations relevant to it. More detailed information on existing environmental conditions is provided at the beginning of each impact discussion in Chapter VI, Environmental Impacts of the ACC and Mitigating Measures. In that chapter, the environmental impacts of the proposal to build or not to build (hereafter referred to as the proposed ACC build and no build alternatives are assessed in 21 different categories. Each impact discussion begins with a presentation of the criteria used to evaluate the impact being considered and other methodologies concerns unique to the discussion. The chapter concludes by presenting the measures that will be taken by the hospital or by public agencies to mitigate any potentially negative impacts.

In the final Chapter VII, Design and Performance Criteria to Minimize Harm, the planning criteria and control measures presented in Chapter VI are translated into environmental "performance criteria," to be used as standards or guidelines against which the ACC should be evaluated. In other words, the ACC should "perform" to the level of the criteria. It is intended that the inclusion of these criteria will make it possible to explicitly incorporate environmental considerations into the design of the ACC.

## SUMMARY OF ENVIRONMENTAL IMPACTS AND MITIGATING MEASURES

### Land Use and Development Plans

Construction of the ACC does not appear to generate enough additional people to strain existing retail services in the vicinity of the site. Under the build alternative, approximately 3 percent more people would visit the hospital daily than visit it now, and these additional people are not expected to increase demand for consumer services sufficiently to warrant new development and altered land use. By the same token, it is not likely that the additional patients and visitors expected to arrive at the ACC by automobile will impede future development in the area. However, existing traffic

congestion and parking shortages are significant and could constrain future development if measures are not taken to alleviate these problems. Recommendations are made in Chapter VII to improve traffic flow and parking.

Zoning

The need for a zoning variance depends on the design of the ACC and on the interpretation of the zoning regulations. Under existing conditions, and with a portion of Parkman Street closed, 311,020 square feet are available for construction of the ACC without exceeding the FAR (floor area ratio) of 4, and thereby requiring a zoning variance. The Certificate of Need application assumes that ACC will contain 350,000 gross square feet, or 320,250 net without mechanical space, and thus a zoning variance would appear to be necessary. However, if the Parkman Street garage is considered an "accessory use" to the ACC, than the ACC site area would be larger, that is, 481,698 square feet would be available to construct the project. Hence the need for a zoning variance will depend on the actual size of the ACC when it is designed, and on the legal interpretation of an "accessory use."

Transportation

A traffic impact area was defined which includes Cambridge, Blossom, N. Grove, Fruit, and Charles streets and Storrow Drive. None of the traffic volumes of these streets exceed the streets' daily capacity, and all but Fruit and N. Grove streets provide an acceptable or nearly acceptable average daily level of service. However, a more critical factor to consider for traffic analysis and planning is that peak hour traffic conditions are congested. While the roadways themselves appear to have the capacity to provide adequate peak hour service, conditions at the intersections cause traffic flow to deteriorate. The congestion at Charles Circle and Leverett Circle, mistimed and incorrectly installed traffic signals, and illegally parked cars degrade peak hour traffic flow at MGH considerably over what could be provided under optimum conditions with the existing street system.

Approximately 12,264 daily visitors to MGH drive more than 4,515 automobiles. Construction of the ACC would increase the campus population by approximately 863 over the existing 13,414, and by 601 over projected 1980 campus population of 14,277 under the no build option. This growth would increase the number of cars to 4,797, which is 282 more vehicles arriving at the MGH campus than at present (4,515) and 226 more vehicles than those projected for the MGH under the no build option (4,571). The additional

traffic associated with building the ACC would represent a 6 percent increase over existing conditions. These average daily traffic increases would fall within the normal range of daily fluctuations of 1980 street traffic, and would not have a noticable impact on traffic during the peak period. Thus, traffic conditions during peak periods would be comparable to the conditions which exist today.

Fifty-three percent of these cars are driven by MGH doctors and staff, and the remainder are driven by patients and visitors. Approximately 1,000 employees park in the North Station lot and ride the shuttle bus to the campus, while 250 doctors park in the Cambridge Street and Charles Street garages. The remaining employees, doctors patients, and visitors park either in the Parkman or Fruit street garages (which together handle 3,000 cars per day), or on the street. At the peak parking period, there is a need for 2,835 parking spaces which, when compared with the supply of 2,320 spaces, results in a current deficit of 515 parking spaces.

Since the majority of the traffic increase at MGH associated with the ACC would result from patients and visitors (both short-term parkers), the increase in demand for parking spaces in 1980 would be minimal. If the ACC were built, the peak parking requirement would rise to 2,949 spaces, resulting in a deficit of 629 spaces.

A number of recommendations have been made to alleviate the parking shortage, under both the build and no build options. The MGH will investigate ways to increase capacity of the North Station lot by improving pavement markings and by initiating a valet parking service. Other off-site parking locations will be investigated in the event that the North Station lot is sold to Boston for a new jail site. In addition, the MGH will consider ways to restructure the use of on-campus parking garages to discourage long-term parking. This would force some employees to shift to use of public transportation or car pooling, and would permit use of the Parkman and Fruit street garages by patients and visitors. A trip-matching service at the hospital would facilitate car pooling and help reduce the parking demand.

Energy Utilization

The ACC would be heated with steam provided by Boston Edison. It is projected that the ACC would exert a demand for 87,220,000 pounds of steam per year. Furthermore, the demand for electricity in the ACC is projected to be 6,090,000 kilowatt hours to operate the air conditioning, lighting, and other equipment. The Boston Edison Company has indicated that they will be able to satisfy these energy demands.

Subsurface Conditions: Geology and Hydrology

Preliminary analysis of the subsurface soil conditions and building geometry has led to the tentative conclusion that the ACC can be founded on a reinforced concrete mat bearing on the stiff clay at the proposed lowest floor elevation. This construction technique would probably result in minor settlement of buildings, within 50 feet of the proposed ACC, which are supported by the clay stratum - primarily the Clinics Building and the Parkman Street parking garage. The ACC itself would also settle slightly. Based on what is now known of the engineering properties of the underlying soils, these settlements would be within tolerable limits for all of these structures. If more detailed geotechnical studies indicate that these impacts would be adverse, the foundation system would be changed to deep piles, bearing on the underlying glacial till or bedrock. Thus, no adverse affects on subsurface conditions of adjoining structures are anticipated from construction of the ACC, by either the concrete mat or deep driven pile foundation, provided that careful geologic and hydrologic studies are conducted during the building design.

Natural Resources

On the site, there are no mineral deposits of any value and the flora and fauna which are present are only those which accompany human settlement. Construction of the ACC would not affect the natural resources of the MGH campus and would provide an opportunity for additional landscaping of the Bulfinch Building courtyard.

Noise Level

The greatest increase in noise level would occur during the excavation stage of the construction if steel sheet piles were driven around the foundation perimeter. Standard air pile drivers with exhaust mufflers would result in noise peaks of around 95 dBA for approximately 4 weeks. If a slurry wall excavation technique were used instead, there would be no significant adverse impacts of construction noise.

The construction noise will have the greatest impact on the intersection of N. Anderson and Parkman streets, where a residential building is now located, and in the White Building courtyard. With equipment quieting measures, these locations would experience noise level increases of 10 and 13 dBA, respectively, which would "sound" twice as loud to an observer.

Along N. Grove Street, adjacent to the construction site, observers would be closest to the construction and would experience the highest noise level. However, since this area is presently very noisy, construction noise at this location would be less annoying due to the "masking effect" of the already high noise level.

With noise control equipment, the noise levels at the residential building on the corner of N. Anderson and Parkman streets would just meet the proposed City of Boston standards of 75 dBA. However, as construction activities moved to the edge of the site nearest that building, the noise levels would, on occasion, exceed these proposed standards.

The one noise problem which remains is the driving of sheet piles during the excavation stage. Although the duration of this activity would be very short, it is likely that the proposed noise regulations would be exceeded during this time period. By the time construction begins, this problem could be solved with the introduction of new pile drivers, now in the prototype stage, which use compressed air and are considerably quieter. Noise would also be controlled by the use of alternate excavation support system, especially the slurry trench system. Both of these alternatives could increase the cost of the foundation, and thus have to be weighed against their benefits.

Solid Waste

Estimates of the solid waste generated by the ACC have been based on current wastes data from the Clinics Building survey, conducted during January 1975, and the survey of clinic visitation conducted for the EIR. Each patient visit to the Clinics Building generates about .48 pounds of solid waste. If the ACC were constructed, outpatient visits would be expected to result in a solid waste load of 4.4 tons per week. This would amount to an additional .4 tons of waste per week over 1980 conditions, or 20.8 tons per year. Much of this increase in solid waste comes from increased use of disposables, rather than from additional patient visits.

Expansion of the hospital's recycling program could reduce the estimated amount of solid waste that the ACC would generate. The MGH currently recycles cardboard and scrap metal, but if the recycling program were to be expanded to include paper, I.V. bottles, and computer printouts and cards, 30 percent of the hospital's trash would then be treated as recyclable. This then would serve to mitigate the effects of both the additional patient visits to the ACC and the increasing use of disposables.

Air Quality

See p. D-21, response (4)

The Moseley and Walcott buildings will be demolished by hand, thereby reducing the dust problems associated with this phase of the project. Excavation of the site and construction of the ACC will produce dust which can be prevented from becoming windborne by wetting with water or calcium chloride. State and municipal air quality regulations require wreckers and contractors to apply reasonable dust control measures.

Between 1975 and 1980, the amount of carbon monoxide, hydrocarbons, and oxides of nitrogen in the air will likely decline, and overall air quality is expected to improve. The ACC will have an insignificant impact on total pollutant generation in the MGH complex. Increases in traffic volumes due to the ACC would produce only 92 additional vehicle miles traveled (VMT) per day. This figure represents only .76 percent of the total estimated VMT on these streets in 1980. Estimates of carbon monoxide levels at six sensitive receptor locations show that the traffic presently on the streets at these locations accounts for a very small percentage of the carbon monoxide levels at these sites. As vehicular controls become more stringent and the fleet of vehicles on the roads is newer, then carbon monoxide levels will improve even more.

Utility Infrastructure

Existing water main, storm and sanitary sewer, gas, steam, and electric services are densely packed under the street and in open spaces of the MGH campus. Construction of the proposed ACC would slightly increase demand for most utilities. In 1980, construction of the ACC would increase water and sewer usage by 10.5 percent, steam usage by 10.5 percent, and electricity demand by 9.6 percent, but decrease gas usage by 9.3 percent. Construction would also impact a number of existing utility lines. In the interest of maintaining the flexibility provided by existing interconnections, the sanitary sewer, water main, and gas lines under a realigned Parkman Street will be relocated. Furthermore, the water, sewer, gas and steam lines northeast of the Moseley Building would have to be realigned to clear ACC foundations and maintain MGH service.

## Water Quality

It is projected that the ACC will increase the sewage loading by 7,280,143 cubic feet per year, or .15 millions of gallons per day (mgd), based on the historical average loadings of the MGH. Most of this sewage will be piped to the Deer Island Sewage Treatment Plant via the West Side Interceptor. During dry weather, Deer Island handles about 300 mgd and the additional load imposed by the ACC would be approximately .05 of this amount. During wet weather, the system is overloaded and sewage is dumped into the Charles River. The Metropolitan District Commission (MDC) is submitting plans to the U.S. Environmental Protection Agency (EPA) for a treatment facility to handle the sewage overflows carried by the Boston and Cambridge Marginal Conduit. This facility would improve the water quality in the Charles River Basin and Boston Harbor by reducing the frequency, volume and strength of the sewage overflows. This facility is planned for completion in 1978, two years before completion of the ACC.

## Aesthetic Impacts

Since the ACC has not yet been designed, the analysis of aesthetic impacts has been confined to volumetric and building size effects, rather than questions related to its texture or form. These effects include scale and massing, views and shadows.

Removal of the Moseley and Walcott buildings and construction of the ACC would increase the visual mass of relatively tall buildings on this part of the MGH campus. The effect of gradually increasing height and bulk, reinforced by the stepped tower of the White Building, would be diminished. Instead, the impression of the MGH as a large, densely developed institution would be made more immediately apparent to the pedestrian, although the actual design could reduce this somewhat by using setbacks. Removal of the temporary structures in the Bulfinch courtyard would recreate this large open space as a foreground for the building itself. This change would help to set off the Bulfinch Building as an historic area.

Views from Beacon Hill down N. Anderson Street to the Bulfinch Building would be slightly improved by the removal of Temporary Building 2 from the Bulfinch Building courtyard. From a few lower-floor apartments, at Charles River Park, a small portion of the views of the Charles River and Boston Basin would be lost. However, construction of the ACC would have almost no impact on the views from the Blackston Housing Project for the elderly.

Moreover, the shadow effects of the proposed ACC are not significant. In summer, the ACC would tend to consolidate shadows in the Bulfinch Building courtyard and add shade to the White Building courtyard. In winter, the ACC offers a slight improvement in the Bulfinch Building courtyard during the morning, and a slight degradation on sunny afternoons.

Historical Impacts

There are three locations of national or local historic importance on or near the MGH campus: the Bulfinch Building, the Beacon Hill Historic District, and the Suffolk County Jail. The most sensitive of these to impacts of the ACC is the Bulfinch Building, located on the MGH campus.

Construction of the proposed ACC presents an opportunity for enhancing the character of the Bulfinch Building by improving its surroundings. Removal of the temporary buildings now in the Bulfinch Building courtyard would increase the open space in front of the building and create a more appropriate setting for the building facade. Moreover, the ACC itself, by its length and height, would form a backdrop for the Bulfinch Building, which would tend to display it better than do the buildings presently on the site. Thus, the overall effect of the ACC on this historic site is positive.

Pedestrian Level Wind Effects

Until the ACC is designed and a model tested in a wind tunnel, there is no way to accurately predict pedestrian-level wind effects. However, the configuration shown in the Certificate of Need does fit two situations which have been studied before and which could have potential wind problems. When the wind blows from the west, which it does approximately 8 percent of the time, winds could be accelerated in the courtyard of the White Building as a result of the relationship of the ACC to the Clinics Building. The amount of the amplification will depend on the design of the building, but could be up to 3 times the free wind velocity in the project area and up to 12 times the protected wind velocity in the courtyard of the White Building. In addition, if the ACC is constructed with an opening for Parkman Street, pedestrian-level winds could be accelerated through the opening as a result of the pressure differences between the windward and leeward sides of the building. Neither of these impacts are certain, and both depend entirely

on the design of the building. A change in the dimensions or orientation of the building and careful design of the ground floor entrance areas could eliminate any pedestrian-level wind problems. To minimize these risks the building model will be tested in a wind tunnel as it is being designed, and the necessary design changes will be made.

Employment

The ACC will have beneficial effects on local employment, especially during its construction, but also after it opens. Construction of the ACC will require about 1,040 man-months of construction effort over a 15-month period. Assuming average pretax construction wages of $1,000 per month results in an income benefit to construction workers of more than $1,000,000. In addition, the ACC would require 30 additional maintenance and security personnel who are not now on the MGH payroll. Assuming an average annual wage of $6,000 results in a long-term yearly income benefit of $180,000.

Retail Trade

The stores in Charles River Plaza, the dominant shopping center in the project area, will benefit slightly from purchases made by the additional patients and visitors at the ACC. Other stores nearer the site which generally cater to the more specialized needs will probably not experience any increased business. Although it is not possible to estimate the amount of retail expenditure by ACC employees, patients, and visitors, it is certain that these expenditures will be beneficial.

Economic Effects on Nearby Property Owners

Property owners near the MGH complex could be affected by the new ACC, some positively and some negatively. At Charles River Park, should 25 physician tenants relocate to the ACC, this could result in a loss of rental income of as much as a quarter of a million dollars a year. However, the vacancy will not occur until 1979, and there is ample time to locate new tenants to offset this economic effect. In addition, if during construction the hospital were to rent space from Charles River Park for MGH administrative activities, these rental revenues would more than offset the loss of rental income from the present 25 physician tenants.

The ACC is not expected to have any economic impacts on property values in Parcel 4B or at nearby residential areas. However, the value of commercial property catering to the retail shopping needs of ACC employees, patients, and visitors could increase if retail trade were to increase.

Municipal Services

The ACC would have an insignificant impact on fire and policy services. The entire building would contain a full sprinkle system throughout, and would be designed with crime prevention as an important consideration.

Relocation

The ACC would not cause any residential or commercial relocation. The only relocation will be that of medical or support facilities associated with the ACC or with the buildings being demolished.

## III - DESCRIPTION OF THE AMBULATORY CARE CENTER

### PURPOSE AND SCOPE OF PROJECT

See pp. D-14 and D-21 for discussion of impact on patient costs.

The Massachusetts General Hospital (MGH) proposes to consolidate and upgrade existing ambulatory hospital services by integrating outpatient clinics, private MGH physicians' offices, ambulatory surgical facilities, laboratories, and other medical support activities in a single Ambulatory Care Center (ACC). The Center would be constructed on the MGH campus, on North Grove Street contiguous to the White Building, on the site of the present Moseley and Walcott buildings. (See Figure III-1, Certificate of Need Alternative.) Although the ACC has not yet been designed, 350,000 square feet are envisioned, at a total estimated cost of $25 million.

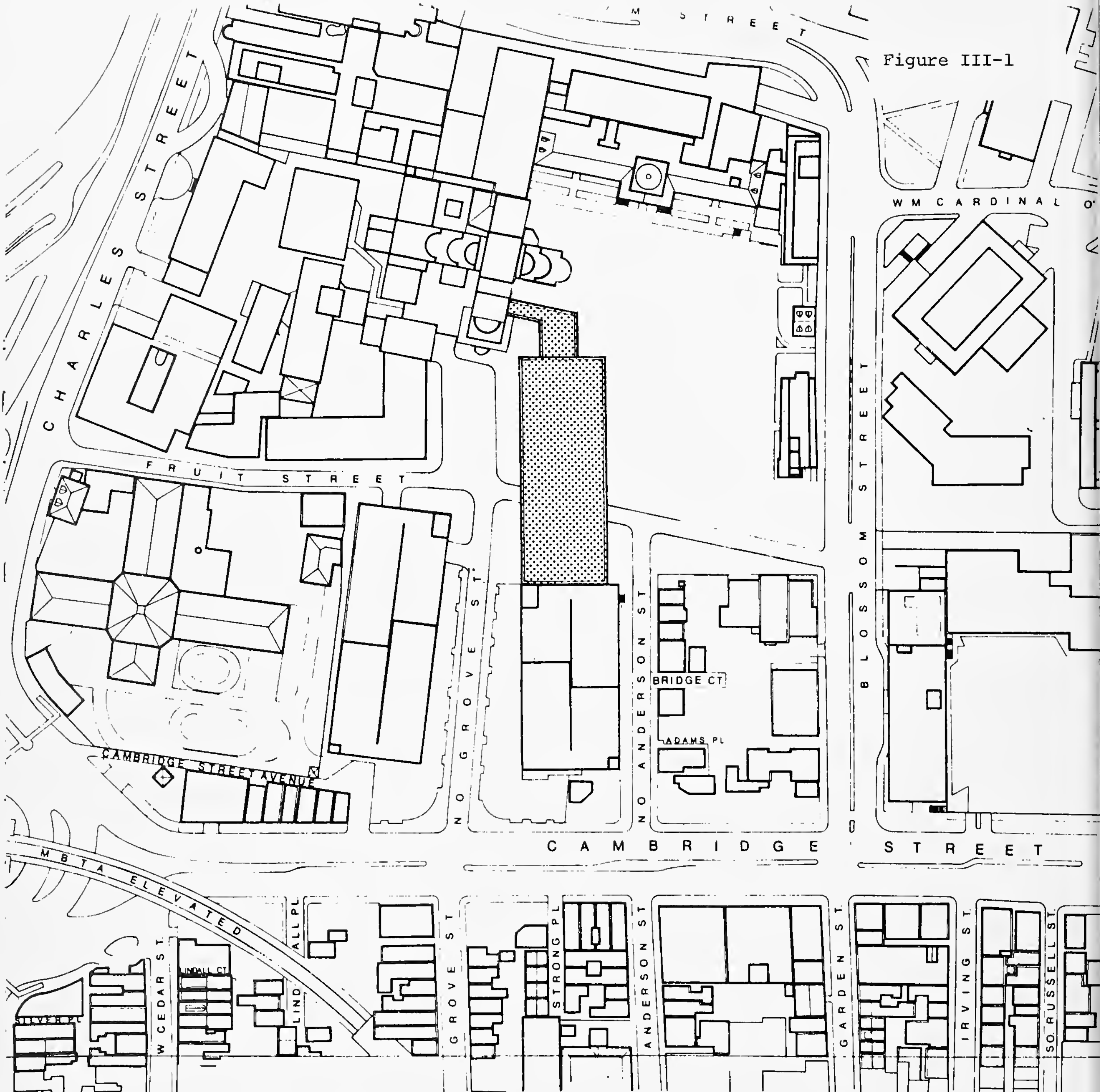
The Center would house 265 physicians and support personnel providing two kinds of health care: primary and referral. Primary care generally involves an on-going relationship between a doctor and a patient. For difficult diagnostic and therapeutic problems, the primary care physician recommends referral care, involving sophisticated interaction between one or more specialists, which almost always requires use of testing services such as radiology or laboratory analysis. The third type of care, episodic care, covers both the acute serious illness or accident which requires immediate attention, and the minor medical or surgical problems which can be treated on a walk-in basis. Such are will be provided in the Emergency Ward and the adjacent Ambulatory Screening Clinic on a round-the-clock basis.

### HISTORY OF AMBULATORY CARE AT THE MGH

#### Historic Growth Trends

The past 10 years have witnessed a clear trend of increasing ambulatory care, both at the MGH and across the nation. Changes in health insurance coverage, increased emphasis on preventive medicine and specialist care, and decreased reliance on private physicians have all contributed to this phenomenon. Clinics visitation has increased stadily from 135,530 visits in 1964, to 226,553 visits in 1974, or 4.3 percent per year. (See Table III-1.) Emergency Ward visitation has grown from 53,017 per year in 1964, to 75,830 in 1973. Correcting for variations in record keeping, one may conclude that these two departments together have grown at a rate of almost

Figure III-1




# Ambulatory Care Center
## Environmental Impact Report

Prepared for
**Massachusetts General Hospital**
**C.S.C.D.C.**
**Massachusetts D.P.H.**

Prepared by
**Resource Planning Associates, Inc.**
In association with
**Wallace, Floyd, Ellenzweig, Moore, Inc.**
**Alan M. Voorhees and Associates, Inc.**

## CERTIFICATE OF NEED ALTERNATIVE

0 40 80 160 240 FEET

FEBRUARY 1975

4.2 percent per year. If one adds the number of visits to the neighborhood health centers, the growth rate is even higher. These figures do not include the volume of patient care given in physicians' and surgeons' offices, although growth in this service is probably small, due to the limited space available for private physicians.

Although primary and episodic care have grown rapidly referral care still provides the largest percent of the visits. A 1973 survey of ambulatory care by type of service indicated that referral care was the reason for approximately 55 percent of all patient visits. Primary care accounted for about 32 percent and emergency and eposidic care accounted for the remaining 13 percent. This information is detailed by number of visits in Table III-2 below.

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TABLE III-1
VISITS TO THE MGH CLINICS
AND EMERGENCY WARD
1964-1974

| Year | Clinic Visits | Emergency Ward Visits |
|---|---|---|
| 1964 | 135,530 | 53,017 |
| 1965 | 139,775 | 56,073 |
| 1966 | 142,425 | 58,085 |
| 1967 | 151,634 | 62,530 |
| 1968 | 162,135 | 66,176 |
| 1969 | 168,564 | 69,695 |
| 1970 | 180,066 | 74,558 |
| 1971 | 190,738 | 76,405 |
| 1972 | 190,854 | 75,170 |
| 1973 | 212,846 | 75,830 |
| 1974 | 226,553 | N/A |

---

TABLE III-2
MGH AMBULATORY CARE BY TYPE OF SERVICE
1973

| | | Number of Visits |
|---|---|---|
| Primary and Comprehensive Care | | |
| Neighborhood Health Centers | 90,000 | |
| MGH Clinics and Offices | 100,000 | |
| MGH MD's Offices, Off Campus | 60,000 | |
| Total | | 250,000 |
| Emergency and Episodic Care | | |
| Emergency Ward | 80,000 | |
| Ambulatory Screening Service | 20,000 | |
| Total | | 100,000 |
| Specialty and Referral Care | | 425,000 |
| Total Ambulatory Visits Per Year | | 775,000 |

## MGH's Response to Growth

The MGH has responded to the increasing demand for ambulatory care in two ways: by expanding its clinics and by establishing neighborhood health centers. The clinics have been expanded by increasing number of hours of operation, by requiring patients to wait for appointments, and by using all available space. The clinics are now open two evenings per week, plus Saturday mornings. A patients survey, conducted for this environmental report, indicated that 13 percent of the patients visiting the clinics had waited more than 2 months for their appointments. Expansion within the Clinics Building, which opened in 1903, has resulted in a maze of corridors and inefficient work space. The clinics are now so busy that patients are subjected to long waits in congested hallways or an overcrowded waiting room, multiple visits for a single diagnosis, and treatment by a different staff of doctors, nurses and technicians during each visit.

Many patients who might otherwise be crowding the clinics even more are now seeking primary care in neighborhood health centers. The MGH opened the Bunker Hill Health Center in 1970, to serve the Charlestown community, and the Chelsea Community Health Center in 1972. Two other centers in the North End and East Boston are also affiliated with the MGH. These centers provide primary care to local residents in the familiar setting of their own neighborhoods. The small scale of these clinics enables them to provide more personalized service than is possible in the hospital itself. Community residents view these clinics favorably partly for their familiarity and partly because of the backup and referral care provided on the hospital campus. Table III-3 shows the growth in the use of the MGH-affiliated neighborhood health centers since they began operations.

TABLE III-3
VISITS TO NEIGHBORHOOD HEALTH CENTERS
1970-1974

| Year | Bunker Hill Health Ctr. | Chelsea Community Health Ctr. | East Boston Neighborhood Health Ctr. | North End Communicy Health Ctr. |
|---|---|---|---|---|
| 1970 | 21,894* | | | |
| 1971 | 46,931 | | | |
| 1972 | 49,605** | | 42,869 | 5,904 |
| 1973 | 49,790 | 9,255 | 54,444 | 13,927 |
| 1974 | 50,914 | 18,000 | 64,885 | 19,606 |

* Includes only 3 quarters of 1970
** Includes Chelsea Community Health Center

The hospital will maintain its commitment to these neighborhood health centers and may expand this commitment to Revere when the necessary core of primary care physicians can be developed. Major expansion of the East Boston and North End centers is scheduled within the next 2 years. The hospital itself will continue to be the major provider of primary care for the West End, Beacon Hill.

## Future Growth Projections Without the ACC

Between 1975 and 1980, when the ACC is expected to be completed, the number of inpatient beds and level of research effort at the MGH is not expected to change. The total number of employees, staff, patients, and visitors which are related to inpatient care and research is not expected to grow, and may even decline through modifications to such programs as nurses training. However, growth in total MGH usage will come about from increased ambulatory services, as described below.

It is difficult to reliably estimate growth in MGH outpatient care. Although there are considerable historical data and growth projections for hospital inpatient services, little data exist on outpatient activity, and most of these existing outpatient data have been gathered from general community hospitals which do not have the same doctor and patient characteristics as the MGH. Because the MGH is primarily a specialized research and teaching hospital, doctors only see outpatients on a half-day basis and so the hospital receives fewer outpatient visits than would a general community hospital at the same location.* But this relationship is not known quantitatively because there are no reliable scaling factors from which to estimate outpatient visitation in a research and teaching hospital, compared with outpatient visitation in a general community hospital.

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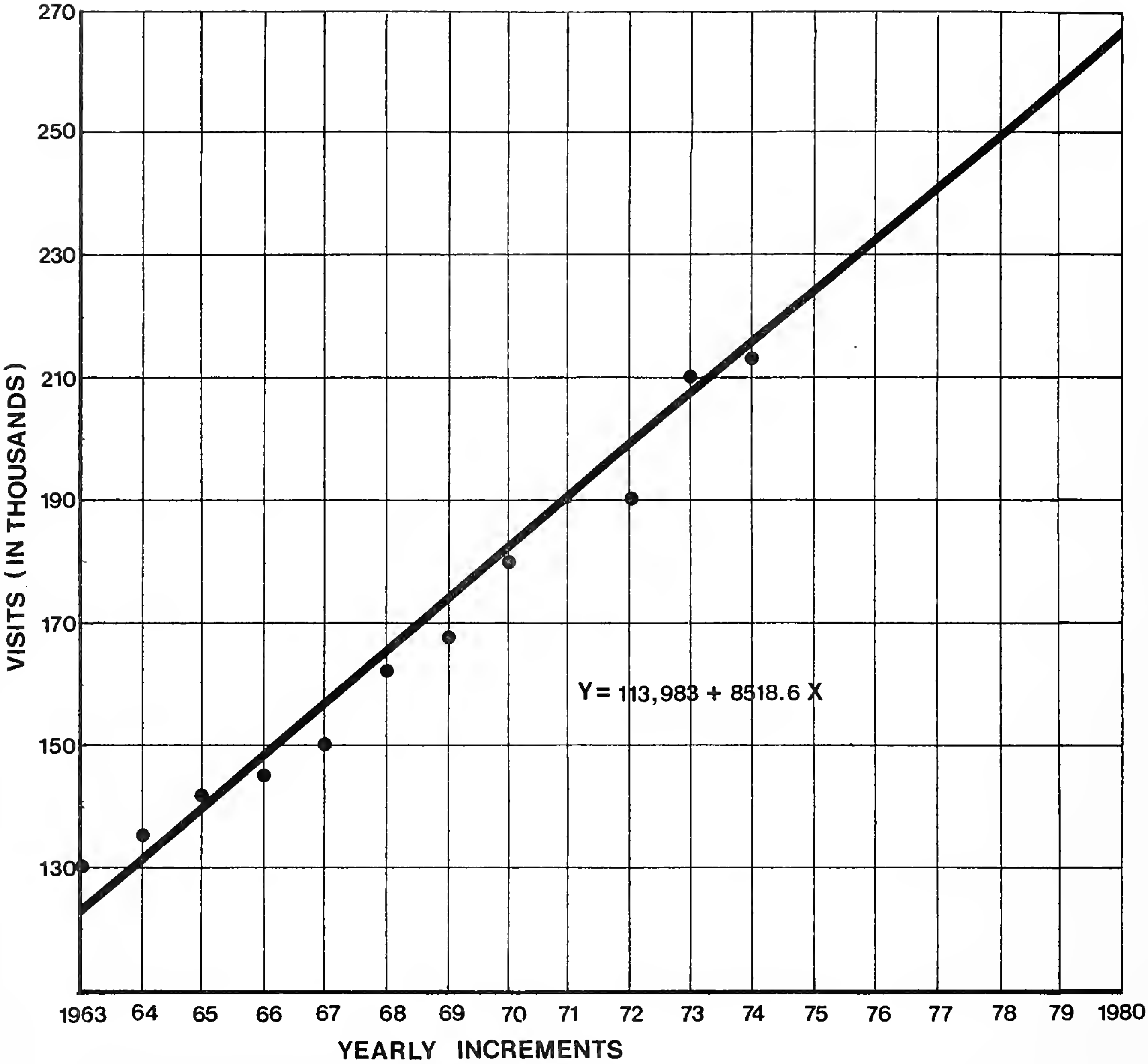
*This tendency was confirmed by a number of hospital and health planning organizations, including Lahey Clinic, Mayo Clinic, Temple University Medical School Hospital, Health Systems Inc., Abt Associates Inc., and the Massachusetts Hospital Association.

For these reasons, the projected 1980 outpatient visitation rate at the MGH, without the ACC, has been based on historical growth trends in clinic visitation. Without construction of a new ambulatory care facility, the growth in demand for clinic services can be expected to continue at an average rate of 4.3 percent per year, as has been experienced during the past decade. (See Figure III-2.) This growth rate would lead to 267,369 clinic visits annually and 1,069 daily in 1980. (See Table III-4.) It is likely that this visitation projection is high (and, therefore, conservative for the purposes of the EIR), and that it would not be achieved by 1980 because of the following underlying assumptions.

First, this projection assumes there will be no significant changes in the delivery of outpatient services over the next 5 years if the ACC is not built. In particular, this projection assumes that expansion of the neighborhood health centers will not curtail growth in patient visits to the MGH campus. In addition, it assumes that the current clinic facilities can accommodate this growth in demand for services. However, this seems unlikely, due to present limited clinic capacity, since many of the 50 specialty clinics presently operating in the MGH are severely constrained by both space and hours of operation. During the past few years, experiments have been made to increase hours of operation and, as a rule, more staff were on hand than patients. Thus it seems unlikely that even a 4.3 percent-per-year growth rate could actually be achieved. However, in the absence of more realistic data, this rate of growth represents a deliberately conservative estimate of the upper limits of growth for outpatient care at MGH.

Not only are clinics severely restrained by this projection, but also private physicians as well. Their productivity (when compared with the clinics) is even more severely limited by the amount of space available to each physician. The average space per private physician is now only 105 square feet, and no significant change is expected in the number of private physician visits between 1975 and 1980 without the additional examining space offered by the ACC. Without additional space for more examining rooms, private physicians are unable to increase the number of people they see each day.




CLINICS VISITS TO THE MGH

Massachusetts General Hospital
C.S.C.D.C.
Massachusetts D.P.H.

Since the Emergency Ward would not be part of the new ACC, growth projections for emergency visits are not included here.

In summary, without construction of the ACC, the total number of ambulatory, non-emergency visits is expected to grow from 547,553 in 1974 to 588,369 in 1980, as shown below in Table III-4. Given these expected changes in the use of ambulatory services, total MGH usage is expected to grow as shown below in Table III-5.

TABLE III-4
ESTIMATED GROWTH IN AMBULATORY CARE VISITS
1974-1980

| Service | Est. Visits/ Yr. 1974 | Est. Visits/ Yr. 1980 | Est. Visits/ Day 1980 |
|---|---|---|---|
| Clinics | 226,553 | 267,369 | 1,069 |
| Private Physicians | 321,000 | 321,000 | 1,285 |
| Totals | 547,553 | 588,369 | 2,354 |

TABLE III-5
ESTIMATED GROWTH IN TOTAL MGH PATIENTS, STAFF, AND VISITORS
1975-1980

| User | Est. Visits/Day 1975 | Est. Visits/Day 1980 |
|---|---|---|
| All Ambulatory Patients | 2,185 | 2,354 |
| Emergency Patients | 230 | 230 |
| MGH Staff & Employees | 7,008 | 7,008 |
| Inpatient Changes | 200 | 200 |
| Vistors & Others | 2,872 | 3,884 |
| Totals | 12,495 | 13,676 |

## OBJECTIVES OF THE AMBULATORY CARE CENTER

The Ambulatory Care Center offers an innovative approach to the challenge of providing high quality outpatient care in the face of continued growth and changing patterns of health care delivery. It would bring together staff physicians and surgeons in a single organizational framework and one building, and contribute to the hospital goals of:

- Providing a single standard of patient care
- Improving the efficiency of medical care and
- Improving medical education.

The two most important constraints on the achievement of these objectives are the requirements that

- Maximum flexibility be maintained in the construction of new hospital facilities, and
- Costly facilities and equipment, especially operating and radiology suites, not be duplicated.

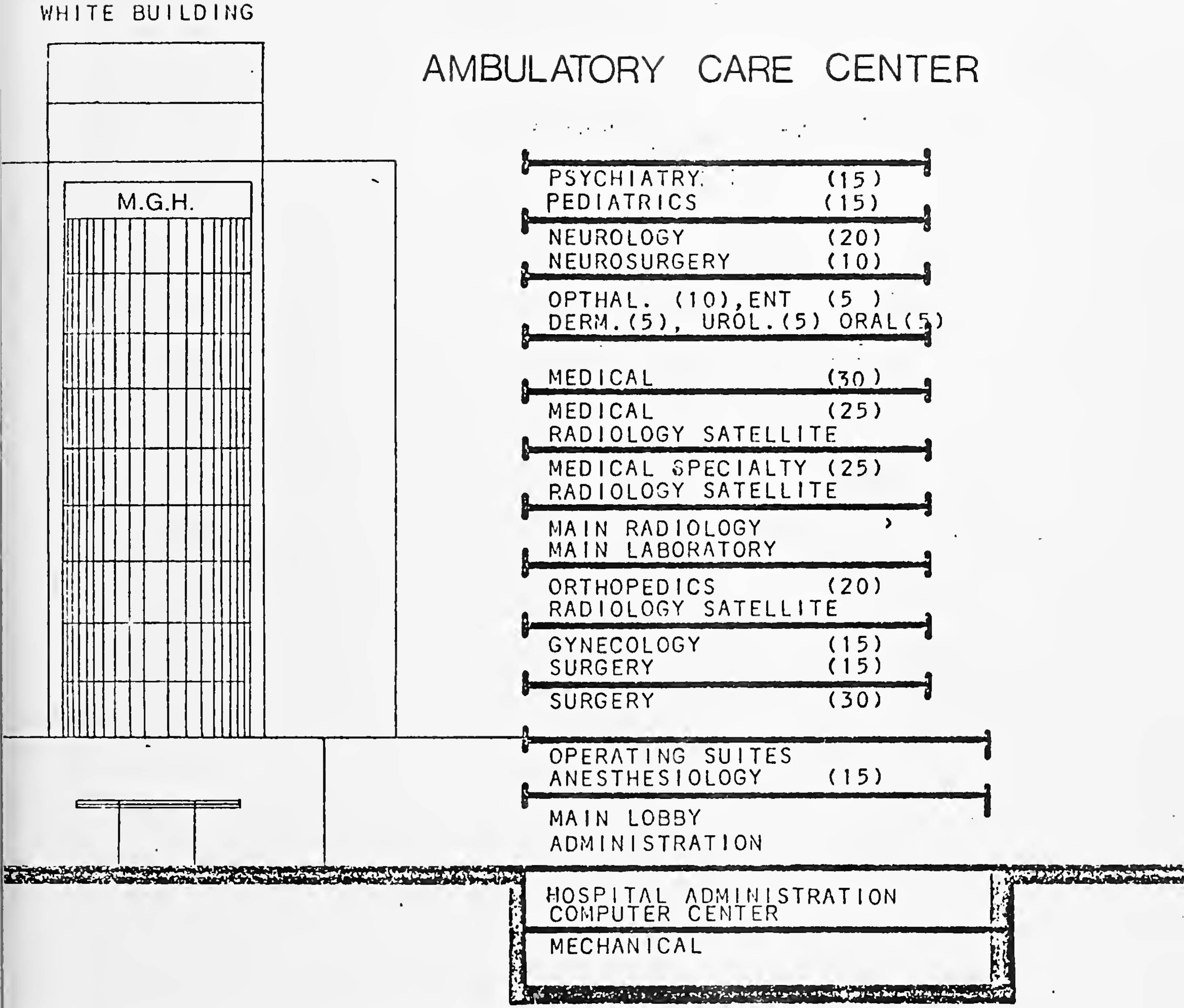
The following sections describe the components of the ACC and then discuss its features as they relate to the achievement of these objectives and the recognition of the constraints.

## COMPONENTS OF THE AMBULATORY CARE CENTER

The Ambulatory Care Center would contain three functionally different types of space: physicians' and surgeons' offices, diagnostic support services, and an ambulatory surgical center. These three types of space are described below.

### Physicians' Offices

The physicians' offices would be organized within the ACC according to medical specialty, e.g., internal medicine, pediatrics, or surgery. All ACC occupants would be members of the active MGH staff, which now numbers approximately 800 doctors. The Center would be staffed by the 75 physicians and surgeons now in the Warren Building, 100 doctors with offices in the Clinics Building, 65 physicians from other offices in the MGH, and approximately 25 physicians with offices nearby. The composition of the ACC, by medical specialty, is shown in the cross-section diagram in Figure III-3.




## ·AST WEST SECTION

# ·.G.H. AMBULATORY CARE CENTER

·BER AND ASSOCIATES, INC., PLANNING AND DESIGN CONSULTANTS

Solo practitioners, partnerships, and small and large group practices are envisioned. Provisions will be made for those doctors practicing full-time, part-time, and those wishing only to share common space. The office setting of a physician with a full-time practice in the Center would include an office, examining rooms, and laboratory or other special purpose space if desired. All occupants would pay $12 per square foot rent for their ACC space, or about $2 per square foot more than they currently pay on and off the MGH campus.

#### Diagnostic Support Services

Clinical and diagnostic testing facilities, including diagnostic radiology, would comprise the second major component of the Ambulatory Care Center. These diagnostic services will be administratively and fiscally independent of the inpatient services. No facilities will be constructed which duplicate existing services. Wherever possible, the ACC will share costly equipment with the comparable inpatient facility on the same floor of the contiguous White Building.

#### Ambulatory Surgical Center

The MGH Ambulatory Care Center is envisioned with an ambulatory surgi-center which would replace the existing ambulatory surgery unit on Baker 11. Although this surgical center would be independent of the main hospital operating rooms (OR), its contiguity to the main hospital OR suite would permit future adjustment without new construction should surgical demand patterns shift.

### RELATIONSHIP OF THE ACC TO PLANNING OBJECTIVES AND CONSTRAINTS

#### Provide a Single Standard of Patient Care

The first ambulatory care unit opened at the MGH in 1846 as a dispensary for the "sick poor." With time, private medical practice and the dispensary clinic became quite distinct and private physicians moved away from the hospital to be nearer their patients. As medical specialization increased, and as these specialists became more and more dependent on the complex machinery only the hospital could provide, this trend was reversed. However, as these doctors returned to the hospital, the clinics and private physican practices were not integrated. Clinic patients were treated by staff doctors, and private patients by their private doctors. Now a primary objective of the ACC is

to integrate its private and clinic patients into a single health care facility with one standard of patient care. There would no longer be a distinction between private patients and clinic patients.

Improve the Efficiency of Ambulatory Care

A related objective of the ACC is to increase the efficiency of ambulatory care and thereby reduce the confusion and delay now associated with outpatient visits. An outpatient who visits the MGH must often wind his way from one clinic or office to another for diagnosis, to one or more laboratories for analysis, and to still another location for treatment. This process may require repeat visits or long waits for consulting specialists or laboratory results.

Much of the confusion encountered in the present MGH Clinics system would be eliminated by the ACC. A central lobby with a single reception area would simplify reception and coordinate appointments so that a patient could visit several offices or clinics and receive a complete diagnosis in one day, rather than return on several occasions. Indeed, in 1974, the average patient made 3.5 clinic visits. Moreover, lengthy waiting would be reduced because of the increased staff efficiency, and improved coordinated appointment scheduling. More individual offices and small clinics would remove much of the impersonal atmosphere now associated with the clinics.

Doctors would also be able to function more efficiently in the Ambulatory Care Center than they can now. If each floor of the ACC were organized by specialty, appropriate specialists could be close by for consultation, avoiding delays in confirming a diagnosis and treatment. If the ACC were located contiguous to the White Building, this would enable doctors to have their offices near their critically ill patients. This arrangement would save doctors the time now required to go from one part of the campus to another.

Considerable efficiency would also be gained by providing the doctors with additional examining rooms. Doctors with only one examining room lose time while patients are dressing and undressing. This time can be spent examining other patients if there are two or more examining rooms.

Efficiency would also be gained by treating some patients on an outpatient basis who are now treated as inpatients. There are presently a number of diagnostic and treatment procedures which are performed on an inpatient basis because outpatient facilities are inadequate. For example, the inadequacy of the Baker 11 outpatient surgical suite forces many surgical procedures to be performed on an inpatient basis, thus utilizing beds which might be used by other, more critically ill patients. Plastic surgery is an example of one service that could be performed more often on an outpatient basis with the new ACC.

Improve Medical Education

A third major purpose of the ACC is to improve the quality of medical education by expanding the scope of patient services to which students are exposed. At present, medical students see primarily critically ill inpatients, but see few who come to the hospital for primary or referral care. This is due to the fact that ambulatory care is spread throughout the hospital which makes it difficult to include it in an educational program. With primary care in the ACC, educational programs and referral care concentrated in one building, educational programs can be expanded to be more comprehensive.

Maintain Maximum Flexibility and Control Cost

The hospital's solution to the problem of maintaining maximum flexibility in this new facility is to construct the ACC contiguous to the White Building which houses the specialty areas common to both inpatient and outpatient services. As the proportion of inpatient to outpatient changes, the relative areas allocated to each can be adjusted without extensive renovation. This approach avoids duplication of costly diagnostic and treatment equipment, especially operating and radiology suites. By sharing these large facilities, optimal utilization can be approached. The co-location of inpatient and outpatient services of a given specialty on a common floor will enable physicians, even when they are in their offices, to respond immediately to inpatient emergencies. This is not now possible because of the generally long distances between doctors' offices and patient rooms.

USE OF THE AMBULATORY CARE CENTER

See p. D-4 response 2.

If the ACC were built, it is expected that medical care would be more efficient because doctors would have additional examining rooms and their offices would have better functional and logistical relationships to support areas and services than is now the case. Some of this improvement would be translated into: fewer visits per patient per year, more patients per physician, more research time for physicians, and shorter waiting time for appointments. Since all of these shifts cannot be estimated accurately at this time, the projection technique used here is to calculate the maximum number of patients that could be seen by the 265 doctors who would be in the ACC and hence the maximum environmental impact associated with the ACC. Since the ACC will provide one standard of care, without the present distinction between MGH Clinics and private patients, there is no need to project clinic usage separately. The question is simply: how many patients can the 265 ACC physicians see per day? There are a number of different ways of projecting such estimates, but again, as with the ACC no build projection, MGH historical usage seems to be the most reliable basis for estimations. MGH provides the following maximum daily visit estimates by specialty.

TABLE III-6
MAXIMUM DAILY PHYSICIAN VISITS BY SPECIALTY

| Specialty (& Max. Visits/Doctor/Day) | Number of ACC Doctors | Total Visits/ Day |
|---|---|---|
| Psychiatry (5) | 15 | 75 |
| Pediactrics (10) | 15 | 150 |
| Neurology (5) | 20 | 100 |
| Neurosurgery (5) | 10 | 50 |
| Opthamology (10) | 5 | 50 |
| Ear, Nose, Throat (10) | 5 | 50 |
| Dermatology (10) | 10 | 100 |
| Urology (10) | 5 | 50 |
| Oral Surgery (10) | 5 | 50 |
| General Medicine (10) | 55 | 550 |
| Medical Specialty (6) | 25 | 150 |
| Orthopedics (7) | 20 | 140 |
| Gynecology (10) | 15 | 150 |
| Surgery (7) | 45 | 315 |
| Anesthesiology (Visits Included in Surgery) | 15 | 0 |
| Total | 265 | 1,980 (7.5 per doctor per day) |

Visits for support services involving social service, laboratory diagnosis, nurse practitioners and the like, are expected to add 25 percent more visits to the ACC, bringing the total visits to nearly 2,480, or almost 10 visits per physician. Thus, the maximum visitation to the ACC in 1980 has been projected to be 2,650 patients per day, or 10 visits per doctor per day. This is an increase of 296 visits per day over estimates of ambulatory care visitation without the ACC. Table III-7 compares the daily MGH campus population with and without the ACC.

Since the ACC would be unique, it is difficult to identify a similar facility with which to compare these visitation estimates. The most comparable tertiary care facility is probably the Lahey Clinic, although its doctors must travel by car to the Deaconess Hospital to see inpatients. Its statistical records show that each doctor sees 8 to 9 patients per day on the average, with some double counting as a result of visits to several doctors by a single patient on the same day. Since the proportion of primary to referral care is lower at Lahey than at MGH, and Lahey is very efficient in terms of scheduling, its records seem generally to support the estimate of 10 visits per doctor as a reasonable maximum for the ACC.

This estimate is also supported generally by a recent projection of referral care done for the Affiliated Hospitals by Massachusetts Hospital Association. They estimated 2.82 visits per year in 1980 per net square foot of medical space. In the case of the ACC, this would amount to 1,918 visits per day to doctors offices and 626 visits for support services, for a total of 2,544 visits. Since the ACC will include visits for primary care, it should be able to see more patients per square foot per day than this estimate suggests. Indeed, the ACC estimate of 2,650 is more than 100 patients higher than the estimate for referral patient visits developed with the Affiliated Hospitals methodology.

## COST OF THE ACC

The Ambulatory Care Center is estimated to cost $25 million, expressed in 1974 dollars. Preliminary discussions with the Health, Education and Facilities Act Agency (HEFA) have indicated that they are receptive to a specific proposal for financing.

TABLE III-7
DAILY MGH CAMPUS POPULATION AND ACTIVITY*

| Population | 1975 Maximum Population | 1975 Actual Daily Population | 1980 MGH Population Without ACC | 1980 ACC Population | 1980 Population of Rest of Campus | Total** 1980 MGH Population With ACC |
|---|---|---|---|---|---|---|
| Physicians and interns | 1,130 | 800 | 1,130 | 265 | 890 | 1,155 |
| Staff, including administration, technical and nurses | 5,878 | 5,289 | 5,878 | 460 | 5,448 | 5,908 |
| Inpatient changes and associated visitors | 480 | 480 | 480 | - | 480 | 480 |
| Bed visitors | 1,626 | 1,626 | 1,626 | - | 1,626 | 1,626 |
| Volunteers | 100 | 100 | 100 | - | 100 | 100 |
| General business visitors | 400 | 400 | 400 | - | 400 | 400 |
| MGH private patients | 1,285 | 1,285 | 1,285 | 2,650 | -<br>88 | 2,738 |
| MGH clinic patients | 900 | 900 | 1,069 | | - | |
| Emergency patients | 230 | 230 | 230 | - | 230 | 230 |
| Visitors accompanying ambulatory patients | 1,185 | 1,185 | 1,278 | 1,430 | - | 1,430 |
| Students & misc. | 100 | 100 | 100 | - | 100 | 100 |
| Service visitors | 100 | 100 | 100 | 20 | 90 | 110 |
| Total Activity | 13,414 | 12,495 | 13,676 | 4,825 | 9,364 | 14,277 |

| Changes in Population | Increase | Percent |
|---|---|---|
| 1975 maximum + 1980 no build | 13,676 - 13,414 = 262 | 1.95 |
| 1975 maximum + 1980 build | 14,377 - 13,414 = 863 | 6.43 |
| 1980 no build + 1980 build | 14,277 - 13,676 = 601 | 4.39 |

*Including the area surrounded by Cambridge, Blossom and Charles streets.
**Assumes maximum population with no one absent.

Rent will be charged for each area's labs, operating rooms, and other needed facilities. It is proposed that each physician will pay $12 per square foot, or approximately $2 more (1974) than the rate MGH physicians and surgeons now pay in the Clinics, Warren Building, and in the office space rented off campus.

# IV - ALTERNATIVES TO THE PROPOSED SITE FOR THE AMBULATORY CARE CENTER

## OVERVIEW

Six criteria were used in evaluating several alternatives that were considered for building the Ambulatory Care Center on the proposed Moseley-Wolcott on North Grove Street. These criteria are derived from the planning, objectives, and constraints established for the ACC, which have been described in Chapter III. The six criteria are as follows:

- To consolidate private physician and clinic functions into a single standard of high quality patient care

- To improve the efficiency of health care delivery, including shifting some diagnostic and therapeutic activities from inpatient to outpatient services, and increasing the number of outpatients that can be seen daily by a physician

- To improve the accessibility of ambulatory care facilities on the MGH campus

- To broaden the scope of medical education to include more contact with ambulatory patients

- To avoid duplication of costly facilities and equipment, especially operating and radiological suites

- To maintain flexibility to accommodate changing trends in health care delivery.

Based on these criteria, several alternatives were considered for building the ACC on the site proposed. This chapter presents three types of alternatives, and evaluates them in relation to the objectives, planning criteria, and constraints established for the ACC. The three types of alternatives are:

- Option One: no build or delayed build option

- Option Two: alternative uses for proposed site

- Option Three: alternative site selection for the ACC.

Since the ACC has not yet been designed, no design alternatives are considered here. Guidelines for the design warranted by the impact assessment are set forth as measures to minimize environmental damage and as design criteria, and can be found in Chapters VI and VII of this impact report.

## OPTION ONE: NO BUILD/DELAYED BUILD

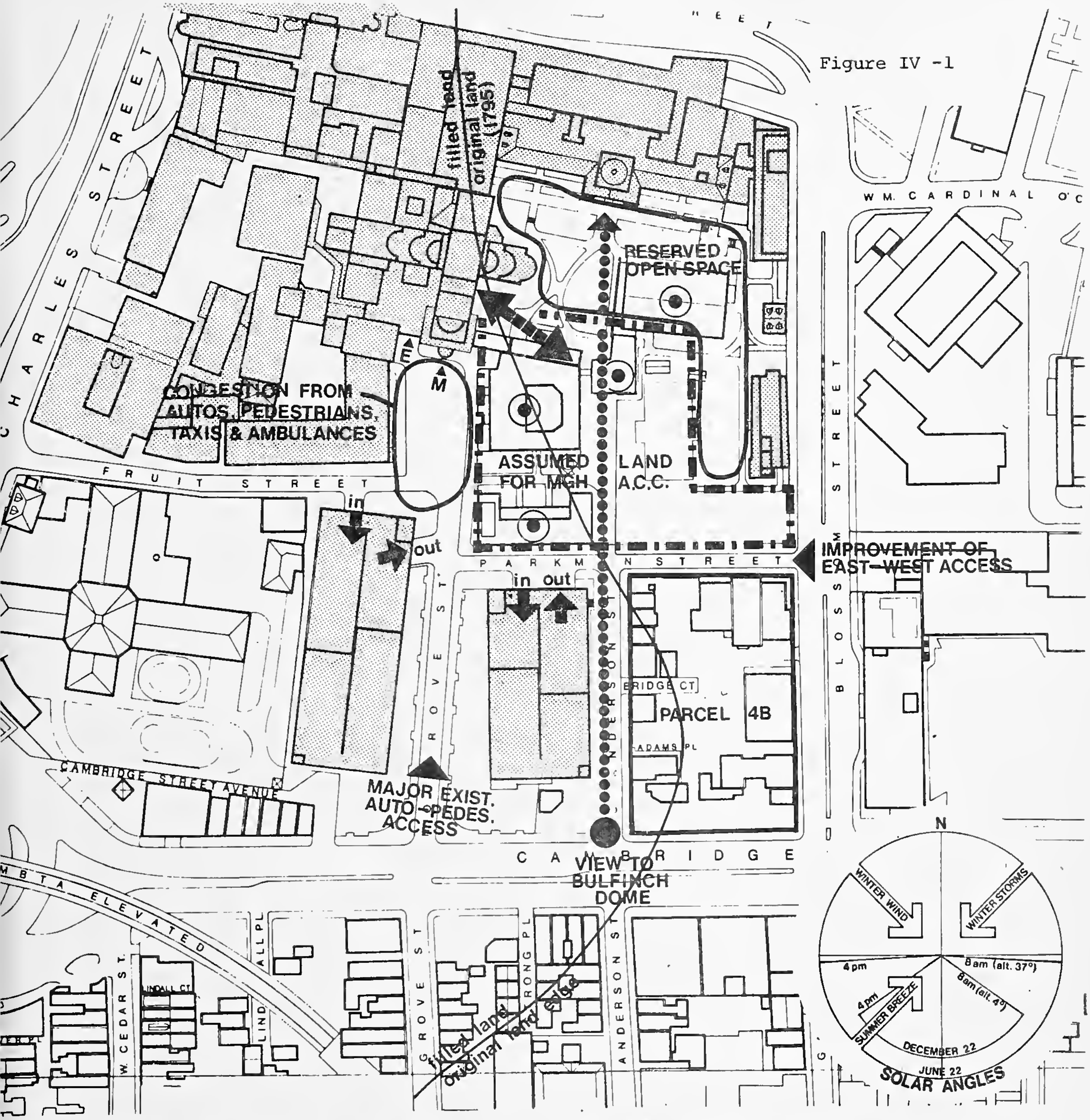
### No Build Option

A decision not to expand MGH ambulatory care facilities would force the continuation of the overcrowded and inefficient health care delivery system that now exists. The consolidation of private and clinic patients and physicians into a single system with one standard of care would not take place. Nor would the potential for shifting some medical and surgical activities from inpatient to outpatient status be realized either. Ambulatory care would continue to be scattered throughout the MGH campus, making doctors' access to their hospitalized inpatients difficult and limiting medical education which presently lacks broad exposure to a full range of patient services.

In order to maintain the standard of patient care that makes the Massachusetts General Hospital one of the best in the country, some expansion of clinic and referral capacity must be made. (See Chapter III for supporting discussion of MGH's response to growth and future growth projections.) There are several options for expanding without constructing a new building. First, the Clinics Building could be remodeled to serve as ambulatory care facilities. But this building would fall far short of the amount of space needed for the ACC, and hence expansion of evening and weekend hours would also be necessary. However, the clinics are already open Tuesday and Thursday evenings and Saturday mornings. The ambulatory screening clinics are open every weeknight until 10 p.m. and have weekend hours. The potential for expanding these hours is limited by staffing problems, and experiments with expanded hours have shown that patients do not fully utilize them (see Chapter III discussion noted above for further explanation).

Even if clinic hours could be increased to make up for the shortage of space, this option would still fall short of the consolidation desired. Without linkage to the White Building, some additional equipment would have to be duplicated.

Figure IV -1




# Ambulatory Care Center
## Environmental Impact Report

Prepared for

**Massachusetts General Hospital**
**C.S.C.D.C.**
**Massachusetts D.P.H.**

Prepared by

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# SITE CONSTRAINTS & CRITICAL FACTORS

REMOVABLE BUILDINGS

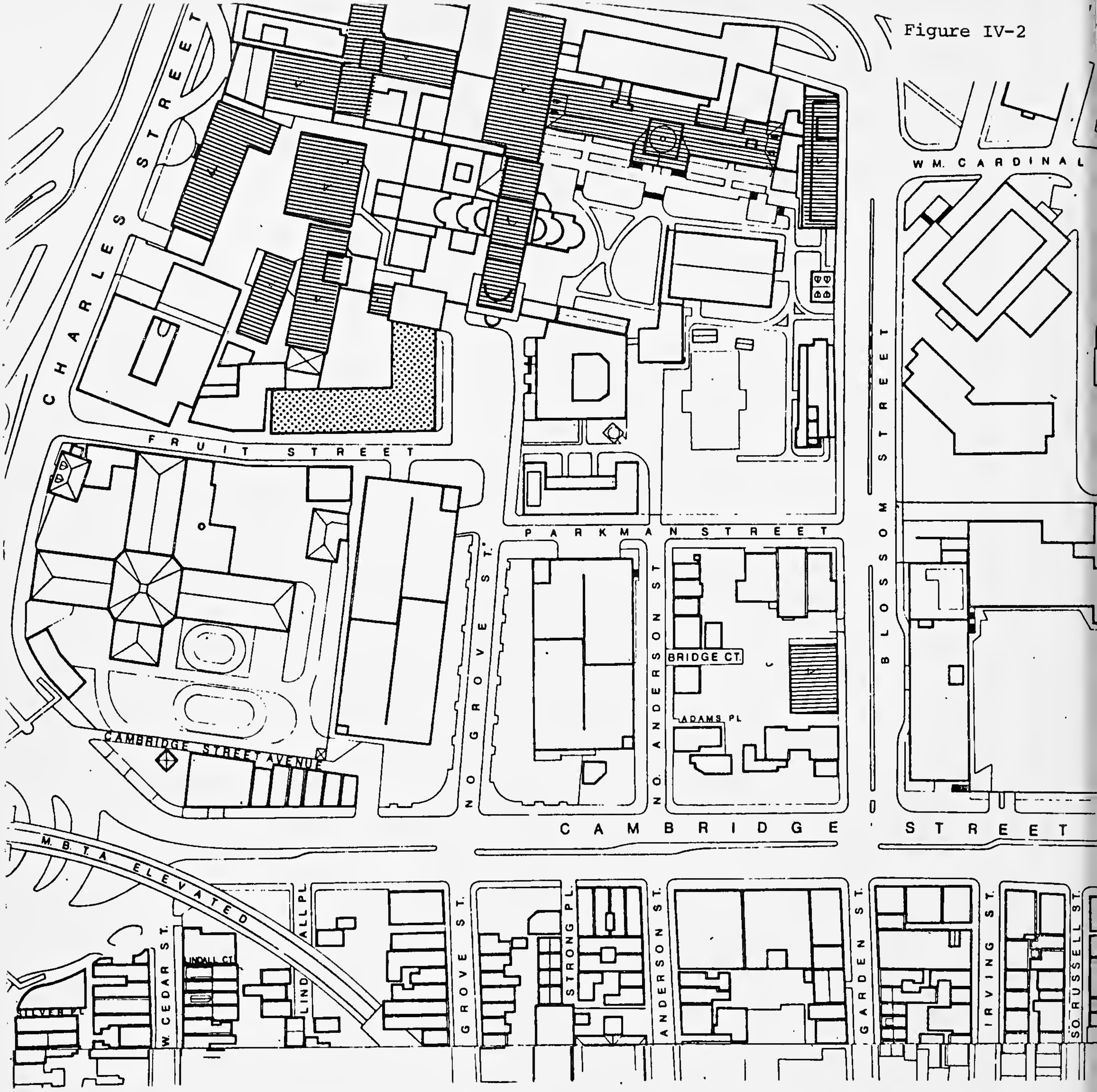
CRITICAL CONNECTION (ACC–WHITE)

M EXISTING MAIN ENTRY

E EMERGENCY VEHICLE ENTRANCE

0 40 80 160 240 FEET

Figure IV-2

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## NO·BUILD ALTERNATIVE

PRESENT DISTRIBUTION OF AMBULATORY CARE

CLINICS

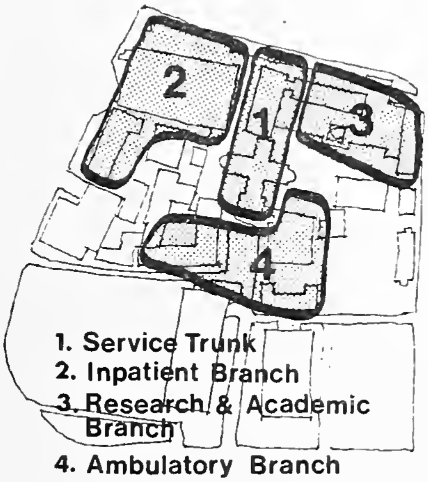
PHYSICIANS

0 40 80 160 240 FEET

FEBRUARY

During the remodeling phase, the administration activities now located in this building would have to be temporarily relocated to another existing building off campus. The extensive remodeling necessary to accommodate the clinics, even on a temporary basis, would require a large financial commitment, but permanent relocation of administrative offices or clinics off campus would seriously hamper overall hospital efficiency.

Another means to deal with a no build alternative would be to rent or buy space in an existing site off campus and permanently convert that space to clinics. This would accomplish the goals of consolidating clinic and private patients and improving the efficiency of outpatient care with additional space. However, doctors would have to travel a longer distance between their offices and their hospitalized patients. In addition, facilities shared by inpatient and outpatient services, such as operating rooms, X-rays, and other diagnostic facilities, would have to be duplicated. Pedestrian access would probably be impaired for patients arriving on the Red Line of the MBTA, although Green and Orange Line patrons would find pedestrian access improved. An extension of Red Line service would increase alternative transportation for patients, doctors, and staff. Moreover, it is not certain that these specialized uses could be accomodated in an existing building. Clearly, this alternative is expensive and requires a long-term commitment to the space. Furthermore, as noted earlier, the advantages to medical education would not be realized either. Finally, the trend toward separation of a large part of MGH patient care activities away from the main spine of the hospital is inconsistent with the trend toward consolidating hospital activities by function, as shown here.




Growth of neighborhood health clinics to divert patients seeking primary care from the MGH campus facilities is still another option under the no build alternative. Both the North End and East Boston clinics will undergo expansion in the next 2 years in order to better serve their constituency. MGH might increase its efforts to establish a center in Revere, but the constraint of training physicians for primary care practice will delay opening of this center as well as any others. While neighborhood health centers are invaluable in providing primary care, the MGH offices and clinics provide necessary tertiary referral care. Thus, the number of

patients seeking care at the MGH will continue to increase, despite growth in the neighborhood clinics.

### Delayed Build Option

Delaying construction of the ACC is an alternative which, in the short term, would have the same effects as not building the ACC. Thus the only rationale for delaying construction would be the selection of a better site which is not now available to the hospital. Such a site might be the Charles Street Jail or parcel 4B, both of which lack opportunity for a direct link to the White Building, and are, therefore, not advantageous sites, if they were available now or in the future. Both these sites are discussed below under Option Three: Alternative Sites for the ACC. Because construction delay would extend opening of the Center for at least 5 years, relocation of physicians' offices and expansion of clinic hours would be necessary. However, because the relocation would be considered temporary, extensive renovation of the relocation facility would not be economically feasible. During the construction delay interval and completion of the ACC project, the present MGH system would continue to function inefficiently. Until construction of the delayed ACC began, there would be no change in environmental quality. When delayed ACC construction did begin, the associated environmental impacts at that delayed construction date would be essentially the same impacts that would be expected were construction of the ACC to begin sooner. However, by that delayed date, quieter construction equipment and improved air and water quality due to improved automobile emissions standards and improved sewer facilities might lessen the degree of adverse impacts associated with a new ACC. Yet, increased costs could occur due to inflation. Therefore, the possible advantages of an alternate site and future enhanced environmental protection, and the possibility of increased costs due to inflation must be weighed against the immediate needs for improved ambulatory health care delivery.

## OPTION TWO: ALTERNATIVE USES FOR PROPOSED SITE

It is only reasonable to assume that the Moseley-Walcott site would be used for hospital functions. The MGH owns the land and its location on the MGH campus makes it valuable for hospital uses. Several hospital uses have been considered, including administrative functions, inpatient bed space, and some future use not as yet defined.

**Administrative Uses**

The proposed site could continue to be used to house administrative functions in the Moseley Building, and Walcott House could be converted to some similar use after the nurses' dormitories are phased out in 1975. This use of the space would not achieve any of the goals of the hospital for ambulatory care. In addition, since administrative space is not easily converted to medical space, this use would not preserve or enhance the flexibility of the hospital's space.

**Bed Space**

Bed space is a second alternative use of the proposed site. During the past 10 years, the MGH has maintained a more or less constant number of beds, even though the number of inpatients has increased. This has been accomplished by more rapid treatment of inpatients and increased use of outpatient facilities. The long-term trends do not show an increased demand for bed space, although a clear trend toward increased demand for ambulatory care is evident. Finally, use of the space for additional beds would not achieve any of the goals the hospital has estabished for improving ambulatory care.

**Preserving the Site for a Future Need**

Another use of this site is to save it for future hospital needs. The future of medical care is always uncertain and there continues to be the possibility of a medical breakthrough requiring specialized facilities. Construction of the ACC on this site would preempt the use of this land for specialty building. Although the ACC could be converted to specialty space at a future time, this conversion would be very expensive. The recent history of medical care has shown that specialty treatment buildings often are obsolete before completion due to new discoveries in disease management. While the future need for a specialty building cannot be dismissed, the trend, reinforced by government policies, is toward multipurpose facilities. This option would not achieve any of the ACC objectives and would fail to observe the MGH goal of maintaining maximum flexibility in future hospital construction.

## OPTION THREE: ALTERNATIVE SITE SELECTION FOR THE ACC

The size and functions of the ACC limit the availability of sites. Easy patient access is important because of the large numbers of patients expected. Because approximately 30 percent of patients would be expected to arrive by subway, the walk from the subway stations should be brief and well marked. The large number of patients expected to arrive by private auto creates a demand for both a drop-off area at the entrance and nearby parking.

Linkage with the main hospital building (the White Building) is viewed as critically important, both to improve staff efficiency, and to enable shared use of costly hospital facilities. Particularly important are the linkages to the White Building at the second and third floors, where the X-ray and operating suites are located. Moreover, linkage across other floors would give physicians greater proximity to their hospitalized patients, thereby allowing more efficient consultation with both their inpatients and clinic outpatients. The training of interns and residents would be enhanced by the opportunity to work with a wider range of patients within a service, such as neurology or internal medicine, ranging from critically ill to ambulatory patients, all located on one floor.

Two locations, other than the proposed site, would be suitable for the ACC's location and would provide connection with the White Building. These two sites are the Clinics Building, and the courtyard between Phillips House and the White Building. However, both of these sites were considered unacceptable for the ACC because the costs and problems of building and relocation would be prohibitive.

<u>Clinics Building</u>

Use of the clinics' site would involve moving the clinics' functions, during demolition and construction, probably to Moseley, Walcott, and other hospital buildings. This would involve relocation of Moseley and Walcott activities and extensive renovation. The makeshift nature of this temporary move would create severe crowding problems, and would most probably cause deterioration in service delivery during the interim period before the ACC is completed. In addition, construction could interfere with ambulance access to the Emergency Entrance located in the corner between the Clinics and White Building. This site would achieve all of the goals of the ACC, except that access would deteriorate with increased automobile congestion around the White entranceway.

<u>Courtyard between Phillips and White</u>

Construction of the ACC in this courtyard would permit consolidation of ambulatory activities in a single building linked with the White Building. However, the site is very small, and would require construction of a taller building than is now anticipated. This design would be less convenient in terms of layout, and would be more costly to construct. In addition, the courtyard lacks direct access to a street, which would interfere with building operations during ACC construction, as well as patient arrivals and departures to the Center when it opens.

## SITES REJECTED FROM FURTHER CONSIDERATION

Three sites were considered and rejected because they lack opportunity for a direct link with the White Building. Without such a connection, the flexibility and efficiency of sharing facilities with inpatient services would not be available, and costs for the ACC would rise considerably. These sites are discussed below.

### Charles Street Jail Site

The Charles Street Jail site is attractive because of its proximity to the Charles Street MBTA station. Patients arriving by public transportation could walk directly to an ACC built on this site. Also, good automobile access would be possible. Linkage with the Clinics Building could permit covered passage into the main hospital complex, but the distances involved would not permit shared use of operating rooms and diagnostic radiology. This would mean that the flexibility of sharing these facilities would be lost, as well as the convenience to staff offered by a direct linkage. In addition, the costs of buying new equipment to replace equipment now shared with inpatient services would be added to the costs of an ACC not attached to the White Building.

The future of the Charles Street Jail continues to be uncertain. The hospital is negotiating with the City of Boston for purchase of the jail site, or its exchange with the MGH Nashua Street parking lot, but no decision on the fate of the jail can be expected before mid-1976. Acquisition of this land by trading the parking lot would impact severely on the MGH employee parking problem. If the Nashua Street lot is no longer used for MGH parking, substitute parking space would have to be made available for MGH parking.

If the MGH were to acquire the land, it could not be used until a new jail were built elsewhere and moving of inmates had been completed. This would delay completion of an ACC for 3 to 4 years. The effects of delaying construction of the ACC have been discussed above (see Option One: Delayed Build Option).

### Parcel 4B Site

The MGH owns 75 percent of the land in Parcel 4B, and because of its proximity to the hospital complex, it was once considered as a possible ACC site. This parcel is now used for a nurses' residence, apartments, and commercial space. Tentative CSCDC plans for this parcel call for commercial development, including a recreation center for West End/Beacon Hill residents, and a hotel to serve the MGH-Government Center area.

Since the parcel is isolated from the hospital, no connection is possible with any hospital buildings. Thus, the lack of a linkage to the White Building, in particular, would preclude the opportunities envisioned by this arrangement. However, this site would offer good pedestrian and automobile access, and MBTA access is about the same as it would be for the proposed Moseley-Walcott site on North Grove Street.

# V - DESCRIPTION OF THE ENVIRONMENT

The following description of the Massachusetts General Hospital environment is presented according to the form of organization for descriptive environmental data suggested by the Executive Office of Human Services' Environmental Protection of "the environmental surroundings as they currently exist, including the physical, economic, and social characteristics of both the immediate area of the project and of the surrounding region." Then follows a description of certain environmental characteristics, as listed in the regulations.

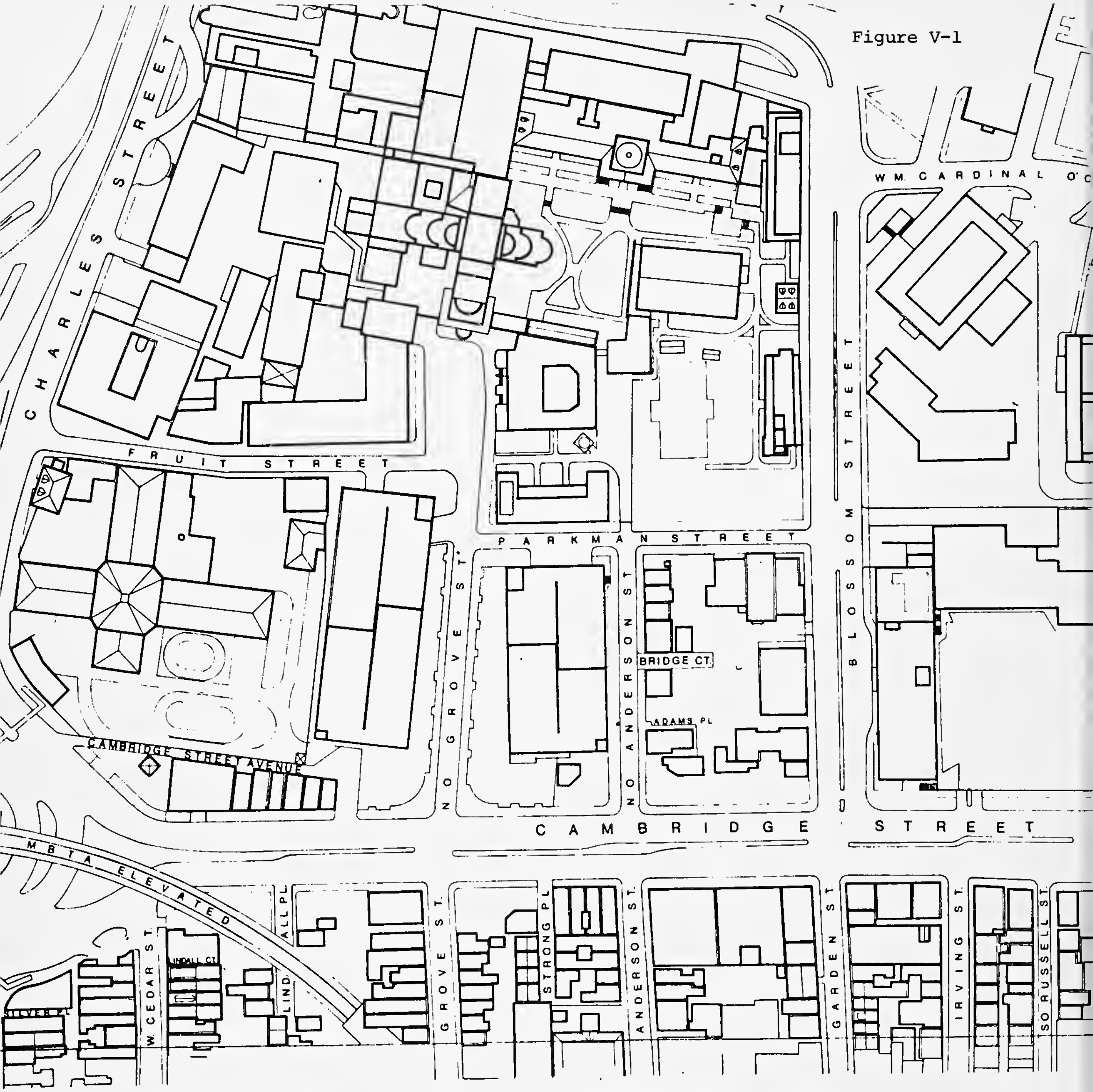
The immediate project area is bounded by Cambridge Street, and Charles Street, including the MGH campus, the Massachusetts Eye and Ear Infirmary (MEEI), the Suffolk County Jail, and Parcel 4B bounded by Cambridge Street, N. Anderson Street, Parkman Street, and Blossom Street, as shown in Figure V-1. The surrounding region includes the North Slope of Beacon Hill, the land between MGH and the Charles River, and the West End Urban Renewal Project (Charles River Park).

## ENVIRONMENTAL SURROUNDINGS

### Physical Environment

The region around the MGH is very urbanized and completely developed as streets, buildings, and parkland. It is heavily traveled, not only by cars, but by pedestrians, and by MBTA patrons. There are two elevated train structures, one situated at the northern edge of the West End Project running from North Station to Leverett Circle north of the campus, the other situated at the Longfellow Bridge, the bridge across Charles Street Circle and Cambridge Street southwest of the MGH campus. Major land uses are institutional, housing, and local commercial. Along Cambridge Street on the MGH (north) side there are three- and four-story brick houses and commercial buildings. Across, on the North Slope of Beacon Hill, there are one- to six-story structures, most of which are commercial on Cambridge Street, and become increasingly residential beyond Cambridge Street moving further up the Hill. New urban renewal development in Charles River Park and on Cambridge Street at Charles River Plaza contrasts with the older buildings. The new buildings are quite tall (13 to 40 stories), concrete and steel, and stand out strongly against the older buildings.

Figure V-1




# Ambulatory Care Center
## Environmental Impact Report

Prepared for
**Massachusetts General Hospital**
**C.S.C.D.C.**
**Massachusetts D.P.H.**

Prepared by
**Resource Planning Associates, Inc.**
in association with
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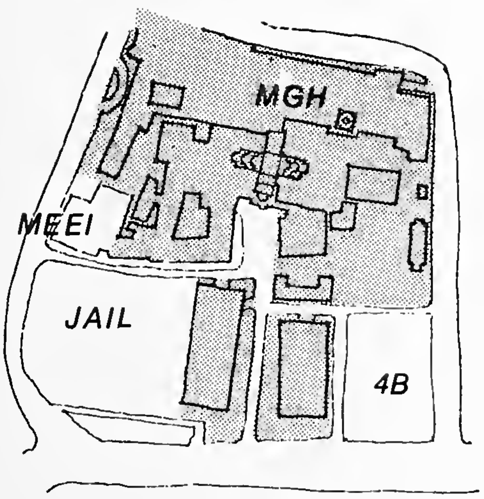
# IMMEDIATE PROJECT AREA




FEBRUARY 197

The MGH campus, although it has some green open space, is a very urban, hard-surfaced and heavily traveled area. Many people travel to the hospital by private car, taxi, ambulance, and on foot, generally arriving at the White Building entrance. The area is nearly always active and often confusing.

The MGH buildings are mostly brick and concrete. The first was built in 1818, and since then major building projects have continued. The physical development has not followed a master plan or layout; most buildings are connected to each other to facilitate circulation. A number of the structures are 14 stories tall, and quite a few others are between 6 and 12 stories, creating a general feeling of a densely built-up space, especially in public access areas.




The MEEI is currently constructing a major addition to its present building. The new entrance will be on the corner of Fruit and Charles Streets.

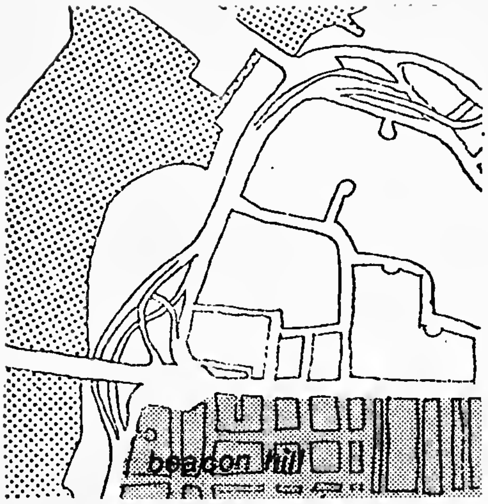
The Suffolk County Jail is a large granite building surrounded by imposing walls, and capped by a distinctive roof, located on Charles Street at the Charles Circle, on the border of the MGH and MEEI. The jail is not readily accessible to the public, and is perceived both from the street and the MGH campus as a monolithic and impenetrable structure.

Parcel 4B is a collection of brick residential and commercial structures, with substantial amount of space between the buildings that are now used for parking. The CSCDC is in the process of purchasing all of the property in Parcel 4B. At present, about 75 percent of this parcel is CSCDC owned.

Economic Environment

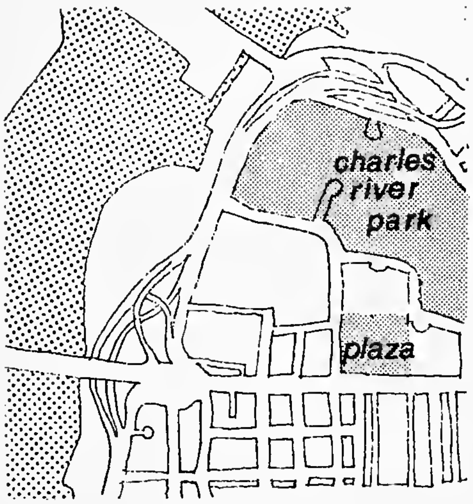
The project area supports three major activities: residential, commercial, and medical services. These activities support the area's economy through property, retail trade, and employment.

Residential: There are two distinct residential areas: Beacon Hill and the Charles River Park (CRP) complex. The Beacon Hill residences are one- to six-story nineteenth century buildings, most of which have been converted to apartment use. Monthly rentals average $141, and 10




percent of the buildings are owner-occupied. Except for a small number of buildings located in Parcel 4B and adjacent to the Boston Edison building, most of these residences are located South of Cambridge Street. Charles River Park is a new, upper-income residential complex in the West End, which includes approximately 2,300 dwelling units with average monthly rentals of $268. Two luxury apartment towers, planned for completion this year, will contain 710 units each renting at $381 per month. In addition, the complex is to include a housing project for the elderly, which is to contain 151 units, each renting at $180 per month.

Medical: Doctors' offices, research laboratories, and other health care facilities are attracted to the area by the hospital. Eighty-nine doctors, including 41 who are affiliated with MGH, utilize CRP office space. These rentals, at $9.50 per square foot plus heat, attach an additional charge through the lease, which contains a tax-escalation clause. An average office size is almost 1,000 square feet.




Commercial: Forty-eight stores are located along Cambridge Street and in Charles River Plaza. The majority are restaurants (31 percent), ranging from fast food to specialty. Convenience services such as laundries, bake shops, banks, etc. account for 20 percent of the total. Eighteen percent of the stores sell convenience goods such as food, drugs and liquor and 12 percent sell more durable items such as apparel, cameras, and jewelry. Only two vacancies were revealed in a Boston Redevelopment Authority survey early this year.

Charles River Plaza includes 17 retail units, totaling 80,000 square feet, the prime tenant being the Stop & Shop Supermarket. The Holiday Inn located at the Plaza is Boston's busiest hotel, operating at near capacity at all times.

In a shopping survey conducted by Dober & Associates, which explored the extent to which the hospital is a source of trade at Charles River Plaza, 143 respondents were interviewed between 11:00 a.m. and 3:00 p.m., and 4:00 p.m. and 6:00 p.m., February 12 and 13, 1974, a midweek, non-payday, non-holiday period. The survey indicates that approximately one-fifth of the shoppers are hospital employees, and nearly one-tenth are in the area for special appointments, generally medical.

Employment: Medical services, centering around the MGH, MEEI, and Shriners Burns Institute, account for most of the employment in the area. The MGH alone employs 7,000 people, and the MEEI has almost 800 employees. Together they account for 12 percent of the 64,500 hospital employees (recorded in 1970) in the Boston Standard Metropolitan Statistical Area.

Construction activities in Charles River Park employ up to 500 workers. The other major employer, the Holiday Inn, has 200 people on its payroll.

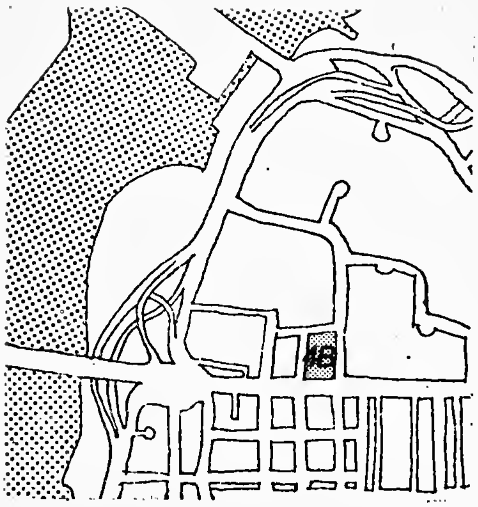
## Social Environment

According to the 1970 census, the population of the North side of Beacon Hill facing Cambridge Street is younger, more mobile, and more often single than that of Boston as a whole. Only 38.9 percent live in families, compared to 78.1 percent for all of Boston; 44.3 percent are primary individuals, compared to 12 percent of the City as a whole. Median household income was $10,900 in 1969, derived mostly from professional and white-collar work.

With the total population of 10,743 on Beacon Hill, representing 117.6 persons per acre, the area population is fairly dense for low-rise development, although the density has decreased since 1960. There are an average of 1.4 persons per dwelling unit. There are very few Black or Spanish-speaking people living on Beacon Hill.

By contrast, Charles River Park, the new, upper-income residential area of the West End, includes approximately 2,300 dwelling units. The population is somewhat older, and more frequently married than Beacon Hill residents. Median household income was $18,900 in 1969.

There are very few permanent residents in the project area. Inmates in the Suffolk County Jail and inpatients in the hospital are transient, and resident students on the MGH campus live there only on a temporary basis. However, adjacent to the Boston Edison building on Cambridge Street there are six connected apartment buildings. Their ground floors are storefronts and the upper floors house 29 residents, including a significant number who have occupied their apartments for as long as 20 years.




Parcel 4B is occupied by about 110 people who live in 60 households. Fifteen percent are elderly, mostly people who were displaced from the old West End by the Urban Renewal project. There are approximately 10 families, including no more than 10 children under 15 years of age. About half of the population is transient, single, and young. There are very few Black people. All of the housing is rented except one unit, which is owner occupied.

Fire and Police Services: Several fire stations are in the immediate vicinity of the MGH. Engine Company No. 4 and Ladder Company No. 24 are located just up the street at 20 Cambridge Street. Stations on Oliver Street and Hanover Street are also nearby.

The MGH complex is included in Police District 1, which covers the North End, West End, Beacon Hill, Government Center, Chinatown, Downtown, and South Cove. The station is located on Sudbury Street. Police crime statistics for the MGH area, bounded by Blossom Street, Cambridge Street, and Charles Street, reveal a high incidence of automobile thefts - 120 in the first 11 months of 1974. In addition, during that same period there were 55 crimes of larceny, 10 burglaries, 10 robberies, and 4 aggravated assaults.

## ENVIRONMENTAL CHARACTERISTICS

### Physiography

The MGH is built mostly on filled land. The Charles River originally flowed into a tidal marsh which covered much of the area. Some of the land is original on the proposed site for the ACC. The land is therefore fairly flat but slopes down slightly toward the River. The entrance to the White Building is located at the highest ground level, some 6 to 8 feet above the intersection of Parkman and North Grove Streets. Across Cambridge Street, Beacon Hill, the highest point in the City, rises to about 100 feet, dominating the area in spite of the tall buildings. Cambridge Street also rises from the River to Government Center.

### Plant and Animal Species and Ecosystems

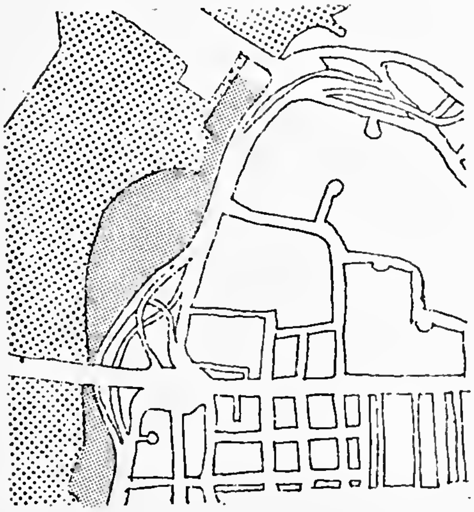
Except for weeds, plant life in the area is primarily landscaping and decorative trees and shrubs. Species represented on the MGH grounds include: oak, horse chestnut, beech, linden, maple, honey locust, lilac, viburnum, dogwood, and cherry.

Few animals other than those which have long histories of association with human activities are found here. The pigeon, starling, sparrow, rat, mouse, dog, cat, and squirrel are examples.

Water

The Charles River, separated from MGH by Charles Street, flows quietly from its source in Hopkinton to Boston Harbor. The stream winds for 80 miles through rural, suburban, and highly developed areas fed by wetlands and small tributaries. The watershed of 307 square miles includes all or parts of 35 communities. The basin which borders MGH is formed by the Charles River Dam, and is used for sailing with other boating by local residents. A new dam, with a better lock system to control tidal and high water flow, is currently under construction. The Army Corps of Engineers has an ongoing flood-control program in operation along the urban portions of the River.

Open Space



The Charlesbank Playground consists of 19.7 acres along the River between Longfellow Bridge, Charles Street Circle, the Charles River Dam, and Leverett Circle. This area forms an extension of the Esplanade devoted to active recreation. Facilities include a baseball diamond, football field, tennis courts, and wading and swimming pools. There are three pedestrian overpasses at Leverett Circle, Charles River Park, and Charles Street Circle to provide access for those arriving by elevated MBTA, and on foot at ground level. The area is heavily used by residents of the West End, Beacon Hill, and the North End, and is the only place for active recreation open to the public in the area. It is administered by the Metropolitan District Commission (MDC).

The Phillips Street Playground on Beacon Hill is a small black-topped playground located on Phillips Street between Anderson and Garden streets. It is used primarily by neighborhood children. The Boston Parks Department plans to upgrade the facility.

Charles River Park has its own open space and recreational facilities for the exclusive use of residents.

The courtyard, in front of the Bulfinch Building on the MGH grounds, is a grassy area with trees crossed by paths. The land rises sharply to the Bulfinch Building, placing it in a formal setting. Almost half the area is now occupied by temporary buildings. When these are removed, the courtyard will provide a pleasant closed-in outdoor space.

Water Quality

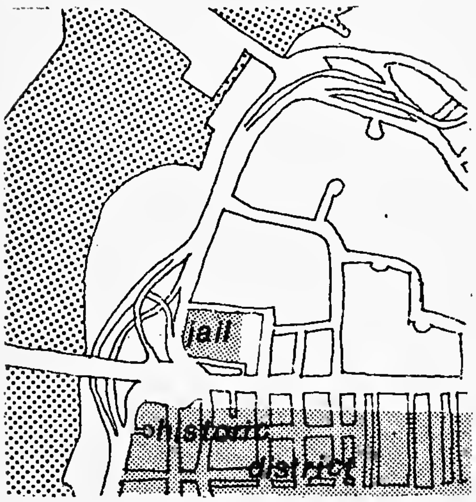
Drinking Water: All drinking water is supplied by the MDC, which obtains its water from the Quabbin Reservoir in central Massachusetts.

River Water: Several point and indirect sources of pollutants exist along the length of the Charles River so that by the time the water reaches the basin of the lower Charles opposite the MGH, the water is severely polluted by organic matter, oil and grease, toxic chemicals and metals, and dissolved and suspended solids. Urban storm-water runoff and occasional untreated sewage from combined sewer systems are the major pollution sources. Because the water is impounded by the Charles River Dam at the Science Museum, The Charles River basin has little net flow or vertical mixing. As a result, the oxygen demand exerted by the heavy bottom sludge layer keeps the bottom water oxygen depleted. Fish and other aquatic life cannot survive in these conditions.

Air Quality

The Science Park air quality monitoring station is located across the Charles River from the MGH. Its proximity to the MGH gives a representative picture of the background air quality conditions prevailing at the hospital. Although some air quality standards have been exceeded recently at this station, the most recent EPA projections indicate that air quality will comply with Federal standards by 1977.

Man-made Features




The historic Bulfinch Building is one of the most interesting man-made feature of this area. The MGH was chartered in 1811, and construction of its first building began in 1818. The building was named after Charles Bulfinch, who was commissioned to design the hospital. He traveled to New York, Philadelphia, and Baltimore to study the most modern examples of hospital architecture available. Construction was then supervised by Alexander Parris. The "Ether Dome" was entered on the National Register of Historic Places in 1965, and the Bulfinch Building itself was entered on the register in 1973.

The Suffolk County Jail on Charles Street was designed by Dudley J. F. Bryant in 1858. Its granite cruciform structure of Italianate inspiration is typical of mid-nineteenth century jail architecture. The Boston Landmarks Commission recognizes the possibility that the building is eligible for inclusion on the National Register of Historic Places.

The Beacon Hill Historic District protects the 19th-century cityscape from inappropriate architectural changes by requiring a permit from the Beacon Hill Architectural Commission before any construction or demolition can take place on the Hill. The District includes the North Slope opposite MGH, as far as 40 feet up the slope from Cambridge Street. The stores in the first 40 feet back from Cambridge Street are not included.

<u>Current Nature of Man's Use of the Area</u>

See p. D-1, response (6)

The Cambridge Street area near MGH has a variety of land uses, including institutional, residential, parking, commercial, office, park and open space, utility, and transportation.

<u>Institutional</u>: The project area is heavily institutional, containing not only the MGH but also the MEEI, the Shriners Burns Institute, Suffolk County Jail, the Retina Foundation, Otis House (offices for the Society for the Preservation of New England Antiquities), and Old West Church. With the exception of the latter two buildings, these institutions are on larger parcels of land and in larger scale buildings than those which are characteristic of the rest of the project area.

<u>Residential</u>: Beacon Hill presents a 19th-century cityscape, with its 3- to 6-story brick row houses situated high on steep, narrow streets. Although the buildings are small, the North Slope area of the Hill is densely populated. On the North Slope there are fewer street amenities than on the South Slope. The area is designated an historic district to ensure that new development will be in keeping with the historic attributes of the Hill. There is a small amount of similar, though less architecturally significant, housing near the hospital. Most of these buildings have commercial use on the ground floor. Recently, new housing has been constructed east of the MGH campus on Wm. Cardinal O'Connell Way. This building (named Regina Cleary) contains 36 units to house retired Roman Catholic priests. On an adjacent site, 176 units for the elderly are planned in a new 14-story structure. The housing was initiated by the West End Community Housing and is sponsored and developed by the State Street Development Corporation. Massachusetts Housing Finance Agency (MHFA) is evaluating the CSCDC mortgage application, and if approved, construction of Blackston Housing for the Elderly would start in Summer 1975.

Charles River Park is an upper-income residential complex built through urban renewal in the West End. When complete, it will contain a total of 2,300 units: 2,179 units in 16- and 37-story towers, 36 units in 3-story town houses, and 152 units for the elderly. The residential parts of the proeject are now either complete or under construction.

Parking: There are a number of parking structures in the immediate vicinity of the proposed project: two on MGH property, one at Charles River Plaza, two in the urban renewal project, and one at the corner of Anderson Place and Cambridge Street, planned to be discontinued for parking use and replaced by CSCDC Housing Development on Parcel 4A. The MGH garages for 1,350 cars flank North Grove Street, with entries and exits on Parkman, Fruit, and North Grove streets inside the MGH campus. The Charles River Plaza Garage enters and exits on Cambridge Street, and serves the Holiday Inn hotel and commercial uses of the Plaza. Also, uncovered parking is available at the Plaza level, one story above grade level. Charles River Park has a garage at Blossom Street and a new 1,200-car facility under construction on Lowell Street.

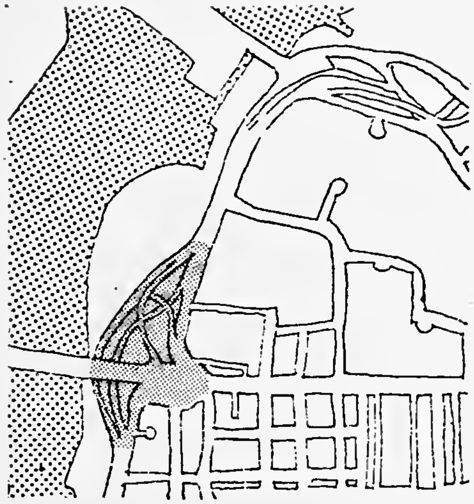
Some open parking is located on Parcel 4B, and, of course, on the streets. There is also an MDC Parking lot in Charles Circle, used by MEEI's staff and visitors. There is, however, no sense of vast expanses of cars in the area since most parking is contained in buildings. On Cambridge and North Grove streets, some traffic problems are caused by double parking by the convenience store shoppers and by those making deliveries.

Transportation and Access: The streets which are in the immediate vicinity of the proposed project have been identified in Figure V-1, and are listed below:

Cambridge Street
Blossom Street
Fruit Street
Charles Street
Storrow Drive and the Charles Street Extension
North Grove Street

Traffic on these roadways was measured to determine volume, peaking characteristics, congestion, and directional flow. The results of these measurements are shown in Table V-1.

Apart from Storrow Drive, Cambridge Street carries more traffic than does any other street in the immediate area of the hospital. Cambridge Street is frequently congested, hindering ambulance and other vehicle access to the hospital. Blossom Street, which also has a high traffic capacity, carries only 7,000 cars - less than half as many as Cambridge Street. The hospital peak hour coincides with the morning peak hour, thereby exacerbating the peak congestion problems in the vicinity of the hospital.



The MDC recently sponsored a study of the Charles Circle interchange. The principal features of the alternatives considered include: changing on and off ramps to Storrow Drive (thereby removing MEEI parking in the existing ramp interstices), making smaller traffic improvements, and synchronizing Charles Circle signals with Cambridge Street signalizations. These traffic improvements would reduce congestion on Cambridge Street and Charles Street Extension, and also increase the effective traffic capacity of these streets. No action is expected on these MDC proposals in the immediate future.

Aside from the streets, which are a major land use, the transportation facilities in the area include four MBTA stations used by area people whose destination is MGH. The stations include: Charles/MGH (Red Line trains), Bowdoin (Blue Line trains), Science Park at Leverett Circle (Green Line trains), and North Station (Green and Orange Line trains). In addition to subway trains, commuter trains arrive at and depart from North Station.

Of the four subway stations, three are elevated (Charles Street Station, North Station, Science Park Station) and one is underground (Bowdoin Station). At the elevated Charles Street Station there are tracks and two pedestrian walkways from the station across Charles Circle with stairs down to street level. At the elevated Science Park station no traffic disruption is caused by the station or walkways. This is also the case at the elevated North Station, where tracks (except for the Boston College run of the Green Line) are connected with the Boston Garden stadium.

TABLE V-1

TRAFFIC VOLUMES IN IMPACT AREA

| | | MORNING PEAK HOUR | | | EVENING PEAK HOUR | | | HOSPITAL PEAK HOUR | | |
|---|---|---|---|---|---|---|---|---|---|---|
| STREET | AVERAGE WEEKDAY TRAFFIC | PEAK HOUR VOLUME | PERCENT OF DAILY TOTAL | VOLUME AND PERCENT IN PREDOMINANT DIRECTION | PEAK HOUR VOLUME | PERCENT OF DAILY TOTAL | VOLUME AND PERCENT IN PREDOMINANT DIRECTION | PEAK HOUR VOLUME | PERCENT OF DAILY TOTAL | VOLUME AND PERCENT IN PREDOMINANT DIRECTION |
| Cambridge St. | 35,000 | 2500 | 7.1 | 1700 - east 68% | 2800 | 8.0 | 1500 - west 58% | 2400 | 6.8 | 1350 - east 56% |
| Charles St. | 15,000 | 900 | 6.0 | 900 - north 100% | 1000 | 6.6 | 1000 - north 100% | 900 | 6.0 | 900 - north 100% |
| Blossom St. | 7,000 | 380 | 5.4 | 200 - north 58% | 700 | 10.0 | 400 - north 57% | 500 | 7.1 | 300 - north 60% |
| N. Grove St. | 7,500 | 500 | 6.6 | 450 - north 90% | 500 | 6.6 | 300 - north 60% | 675 | 9.0 | 525 - north 77% |
| Fruit St. | 1,600 | 50 | 3.1 | 50 - west 100% | 75 | 4.6 | 75 - west 100% | 150 | 9.3 | 150 - west 100% |
| Storrow Dr. Embankment Rd. (Includes Merge) | 98,000 | 6600 | 6.7 | 3800 - west 58% | 5800 | 5.9 | 3300 - west 57% | 5800 | 5.9 | 2900 - west 50% |

Commercial: Commercial establishments along Cambridge Street are predominantly convenience goods and service businesses: cleaners, corner grocery, fast food restaurants, laundry, drugs, barber/beauty, bars, and gasoline stations. In Charles River Plaza there is somewhat more emphasis on primary shopper's goods: apparel, shoes, gifts, jewelry, and a florist, as well as a supermarket and beauty shop. There is also a movie theatre and a hotel. In contrast to the relatively new Plaza, most Cambridge Street businesses are housed in one-story structures, or located on the first floor of otherwise residential buildings.

Charles River Plaza, part of the West End Urban renewal development, includes a parking garage with an outdoor plaza on its roof deck, surrounded on three sides by a 300-room hotel, a movie theatre, and a variety of shops and office buildings. The stores and parking deck are one-story above street level at the west end toward the MGH, and are at the same level at the east end where the street rises. For all the shops, and especially the supermarket, business is quite good.

Charles River Park also has some convenience shopping associated with its residential uses. A drug store, dry cleaner, small grocery, wine and beverage outlet, beauty shop, and restaurant serve the residents.

Office: Office use is relatively minor in the area. One of the buildings under construction at Charles River Park is to be used for office space. Another office building is located in Charles River Plaza, and several office buildings are located at the most southern edge of Government Center which borders on this area. There are, in addition, 400,000 sq. ft. of office space, either occupied or under construction. The furnished office space serves doctors, engineers, and other professionals.

Parks and Open Space: For outdoor recreation, most residents of the West End use Charles River Park facilities and Charlesbank Playground. Most Beacon Hill residents use the Common and Charlesbank Playground.

Utility: Boston Edison maintains a switching facility on Cambridge Street in front of the Suffolk County Jail. The brick structure is quite large, about 7- to 8-stories tall, and institutional in scale. It has no windows and dominates the scene for pedestrians as they cross the MBTA overpass to the north side of Cambridge Street.

Rare and Unique Aspects

The area is an integral part of the functioning city. Charles Street Circle is a significant transportation node for the region, and the MGH is an important medical center serving the City of Boston, the state, and to some degree the Nation. The MGH offers both general and specialized facilities and services, ranging from primary health care, to cancer treatment at Cox Cancer Management Center. In the history of the development of medical science, the hospital is also noteworthy due to its research and teaching.

Ambient Noise Levels

Noise measurements were taken at 14 locations in and around the MGH campus. The measurement location, shown on Figure V-2, include sensitive noise receptions such as the nearest hospital, residences, and commercial buildings.

Results of the measurements are shown on Table V-2 and Figure V-2. The noisiest outdoor locations are along Cambridge Street (locations 10 and 11), where levels of 75 and 76 dBA are recorded. The higher noise level recorded on the south side of the street reflects both the location of an adjacent stoplight, where cars are typically accelerating, and the overall higher traffic volumes on Cambridge Street's adjacent eastbound lanes. The quietest outdoor location was number 8, in the MGH courtyard near Bartlett Hall, which is screened from traffic noise by adjacent buildings. Other outdoor sites ranged between 63 and 72 dBA. In a study conducted for the Federal Environmental Protection Agency, 70 dBA is defined as a typical ambient noise level for urban areas.*

---

*Report NTID 300.1, Noise from Construction Equipment and Operation Building Equipment, and House Appliances, by Bolt, Beranek and Newman, December 31, 1971.

Table V-2

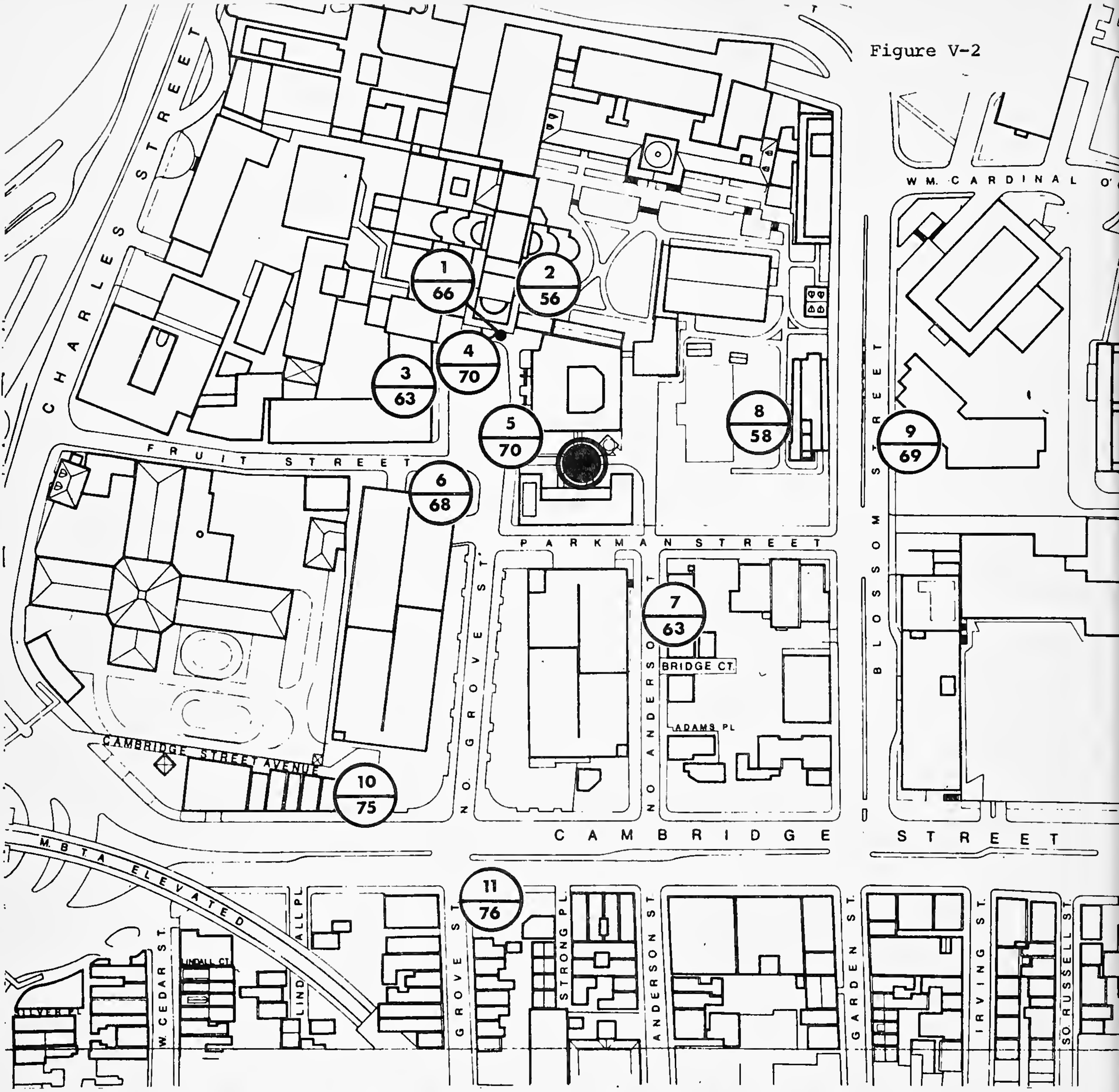
MEASURED AMBIENT NOISE LEVELS
(Energy Average or "L-Equivalent" ($L_{eq}$), in dBA)

| Point No. | Location | Measured Ambient $L_{eq}$ (daytime) | Measured Ambient $L_{eq}$ (night-time) |
|---|---|---|---|
| 1 | White Bldg. inside main lobby | 66 | |
| 2 | White Bldg. fifth floor, patient bedroom | 56 | |
| 3 | Clinics Bldg. Ambulatory Screening Clinic | 63 | |
| 4 | Outside White Bldg. main entrance | 70 | 66 |
| 5 | N. Grove St. South edge of Moseley Bldg. | 70 | |
| 6. | N. Grove St. near parking garage entrance | 68 | |
| 7 | N. Anderson St. MGH property line | 63 | 58 |
| 8 | MGH courtyard Bartlett Hall | 58 | |
| 9 | Blossom St. east side Blackstone School | 69 | |
| 10 | Cambridge St. north side Boston Five Cents Savings Bank | 75 | |
| 11 | Cambridge St. south side N. Grove St. | 76 | 73 |
| 12 | Parking Garage B entrance, Parkman St. | 67 | |
| 13 | Bulfinch Bldg. main entrance | 72* | |
| 14 | N. Grove St. south of Cambridge St. | ** | 65 |

* High level due to loud exhaust fan of temporary building in Bulfinch courtyard

** Only night-time measurement taken

Figure V-2




# Ambulatory Care Center
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## PRESENT AMBIENT NOISE LEVELS

SOUND LEVELS IN dBA

A.C.C. SITE

LOCATION NUMBER
AVERAGE SOUND LEVEL

0 40 80 160 240 FEET

FEBRUARY 1975

These results indicate that fairly noisy outdoor conditions typical of an urban area prevail in and around the MGH campus during the daytime. Less extensive night-time measurements indicate, as expected, somewhat lower noise levels. Motor vehicle traffic was the predominant noise source at all locations, except number 13 which was predominantly influenced by the steady noise of the exhaust system of the temporary building in the Bulfinch courtyard.

Daytime measurements were also taken at 3 locations inside MGH buildings likely to be affected by noise from construction of the ACC. These measurements also indicate relatively high noise levels - particularly at location number 1, the main lobby of the White Building. The quietest condition recorded was 56 dBA in a patient room on the fifth floor of the White Building.

# VI - ENVIRONMENTAL IMPACTS AND MITIGATING MEASURES OF THE AMBULATORY CARE CENTER

## INTRODUCTION

### Impact Assessment Strategy

A basic concern of the Massachusetts environmental impact review process is that the impact report be undertaken as early as possible in the planning process. The Department of Public Health (DPH) regulations reflect this concern by requiring preparation of the EIR prior to issuance of the Certificate of Need. In this instance, the impact report is being prepared prior to the development of any actual architectural design on the proposed structure. The lack of a building design offers both opportunities and constraints for the impact assessment. The impact assessment is constrained to a single design alternative which is based on known features of the building and those reasonable extrapolations which will not constrain the designer to an architecturally inefficient solution. Thus, the impact assessment in this chapter is confined to two alternatives:

- Certificate of Need application, modified slightly to reflect greater precision of programmatic elements developed since the application was submitted

- The no build alternative.

In any impact assessment it is clear that some impacts are related to the use of the project, regardless of how it is designed, and some impacts are closely tied to a specific design. For example, the amount of solid waste generated by ACC activities will be the same, regardless of how the building is designed. Aesthetic impacts, on the other hand, will vary considerably. The lack of a design at this stage has provided an opportunity for the environmental team to recommend design solutions which will minimize potentially negative impacts. Since the project is still in the early phases of the planning process and no one is yet committed to a design, these measures are likely to be incorporated into the final solution that is developed by the architect.

The environmental team, the MGH, and the CSCDC have developed design or performance criteria for each type of impact which could change as a result of the building's design or construction method. One or more examples are offered of how the criteria might be met, and it is intended that the actual design and construction of the building perform as well or better than these examples in terms of the criteria.

## Impact Assessment Methodology

The conceptual framework for impact assessment consists of a matrix in which the characteristics of the project are arrayed against 18 different impact categories. While some redundancy is unavoidable in such a system, for the most part each impact category concerns a unique set of issues. These impact categories are the following: land use; zoning; development plans; transportation; energy utilization; subsurface conditions; natural resources; utility infrastructure, including water, sewer, and electric services; water quality, air quality; noise level; solid waste; aesthetic impacts; television and radio reception; historic sites and open space; pedestrian level wind effects; employment; retail trade; economic effects on adjoining land owners; municipal services, and relocation.

The impact assessment process and its documentation here consists of two stages: the first stage is the value-free identification and measurement of impacts in quantitative or qualitative terms; the second stage is the evaluation of impacts as positive, neutral, or adverse. In the first stage, impacts are expressed quantitatively in all cases except those few where data do not exist. Maps and sketches are used frequently to illustrate impacts, especially those related to the physical enviornment. Where adverse impacts are identified, measures to minimize harm are discussed immediately following each impact assessment. The time frame for the impact assessment has two stages: short term and long term. Short-term impacts are those that will likely occur during the demolition and construction (1976-1980); long-term impacts are those associated with the ACC's operation which will have stabilized around 1980. It is difficult to predict impacts beyond 1980 because reliable data are not available concerning either the environment or the methods of health care delivery.

In order to reach some conclusions about the impacts, some value must be given to them. The evaluation of impacts as either beneficial or adverse is a very sensitive and difficult task. There are few changes in the environment, broadly defined, that everyone can agree are obviously good or bad. Most change is good for some group interests and bad for others.

Three different approaches have been used to evaluate impacts in this environmental report. In a few cases there are environmental standards against which to compare impacts and determine if they are acceptable. The air quality standards are one obvious example. A second approach is to establish planning criteria against which to evaluate the change. This has been done, for example, in the case of impacts on historic sites where criteria have been established by the National Commission on Historic Preservation. Where these criteria are not published, planning documents for the area have been used in conjunction with consultation with the Boston Redevelopment Authority (BRA) in its role as the city's planning agency.

Even with these attempts to evaluate impacts from the viewpoint of the community's well-being, there are inevitably judgments which conflict with the interests of a particular group of people within the community. Faced with the dilemma of having to make judgments about the value of impacts, environmental assessors are turning more and more frequently to the public and the political process. This involves soliciting views of public officials, and active participation by citizen groups in the decision making process. Through community meetings and review of the draft environmental impact reports, public and private decision makers and local citizens ascribe values to the impacts, and ultimately a decision is made. The broader the participation in this review, the more likely the final decision is to reflect all diverse interests of the community. It is hoped that the review of this document will help to stimulate and organize the views of public officials and private interest groups, and thereby contribute to a sound decision.

## LAND USE

### Sources of Land Use Change

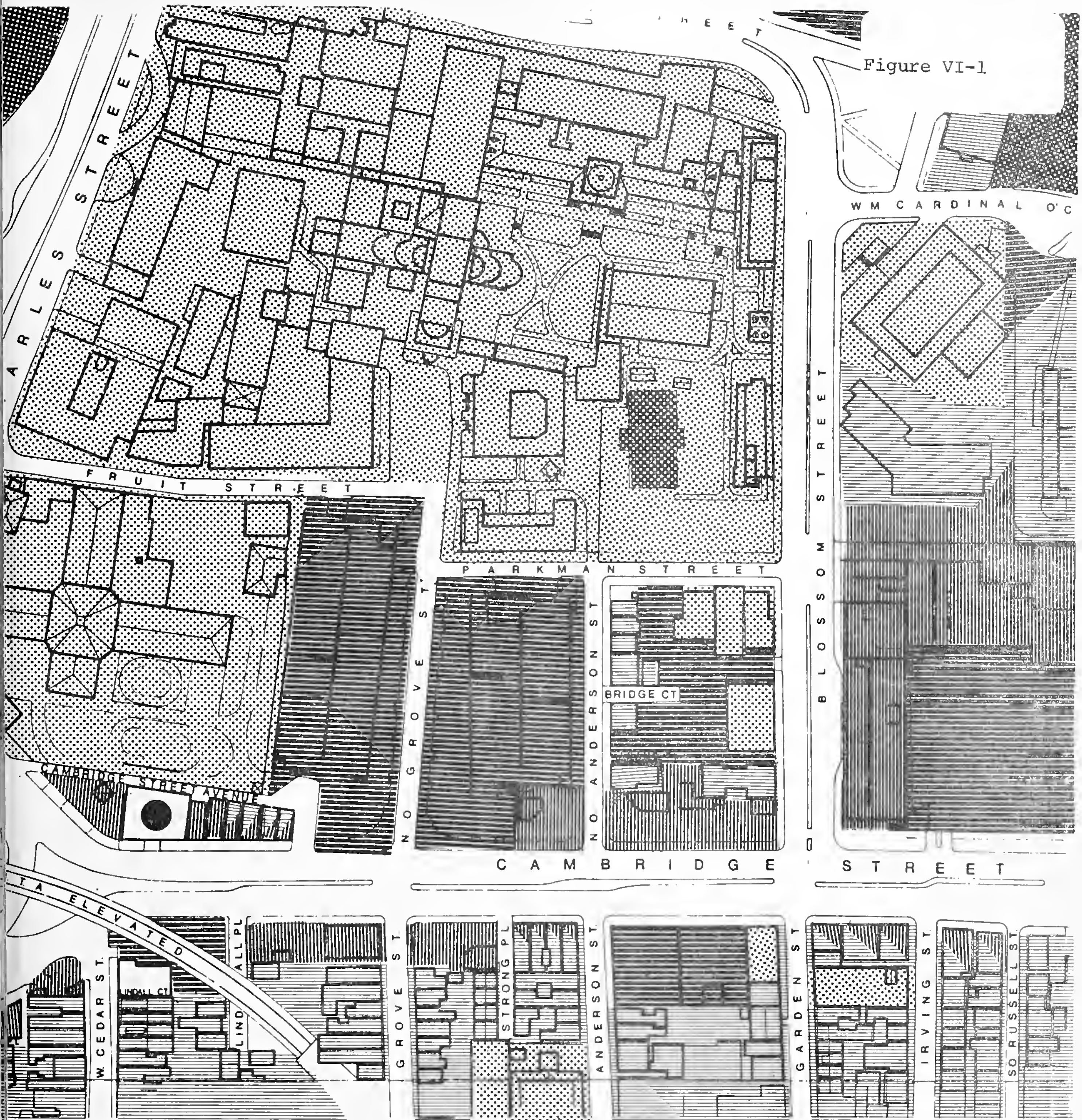
New or more intensive uses of land can have a variety of direct and indirect effects on neighboring parcels. When the demand for services can be satisfied with existing uses, then most likely no land use change will occur. But when existing uses are inadequate, there can be pressure for expansion of existing uses or entirely new uses of land. However, there are a host of other factors - such as tax policy, zoning regulations, and changed transportation access - that can override any pressures for changing land use that is created by new development.

There are a number of ways in which future hospital use of the proposed ACC site might influence the existing mix of neighboring residential, commercial, and institutional land uses. (See Figure VI-1.) First, the proportion of land devoted to different uses (commercial, residential, etc.) could change if patients and visitors coming to the ACC were to create a demand that could not be saitsfied by existing development. One obvious example would be an increased demand for commercial services in the area. Another could be more pressure for parking facilities if additional parking demand were to exceed capacity and this usage were encouraged by the City of Boston. Ultimately, development of nearby parcels could be affected if the ACC generated traffic or utility loads were significant enough to constrain future growth in the area. The impact of the project on land use is considered in this section. The implications of these changes for specific development plans are considered in the following section.

### Impacts of the ACC

Neither ACC alternative - build, no build - which are being studied, appear to generate enough additional people to strain existing services on adjoining parcels. The increases in people coming to the MGH are small percentages of the present total - 2 percent for the no build options and 3 percent for the build option. This increase will also be spread out over the entire working day. Thus, these additional people are not expected to increase demand for any consumer services, including food service, in the project vicinity.

Figure VI-1




# mbulatory Care Center
## nvironmental Impact Report

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red by

**source Planning Associates, Inc.**

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**llace, Floyd, Ellenzweig, Moore, Inc.**
**n M. Voorhees and Associates, Inc.**

# EXISTING LAND USE

| | |
|---|---|
| INSTITUTIONAL | PARKING |
| COMMERCIAL | RECREATION |
| RESIDENTIAL | UTILITY |

0 40 80 160 240 FEET

While neither alternative (build/no build) generates a significant increase in MGH visitation, about 57 percent of the new arrivals are likely to come by private car. This represents an increment of 28 additional vehicles for the no build option and 282 additional vehicles for the ACC build alternative. This does not represent a significant impact in terms of street congestion that would result in more land being used for transportation. (See traffic and parking section.) However, existing traffic conditions do warrant attention and recommendations have been made in Chapter VII to improve traffic flow. If measures are not taken to alleviate traffic congestion and parking shortages, the future development of nearby parcels of land could be constrained.

As indicated in the traffic and parking section, current use of the MGH is straining parking facilities, and the existing parking deficit would be increased slightly with construction of the ACC. Solutions to this parking problem will involve modifications to the North Station lot, changes in MGH parking policies, and a search for additional off campus parking. It will not involve construction of any additional garage space on campus.

In summary, any land use changes appear to be directly related to current traffic and parking conditions and not to the construction of the ACC. The implications of these conditions and other ACC impacts on the development of nearby parcels is discussed in the following section.

## DEVELOPMENT PLANS

### Current Development Plans

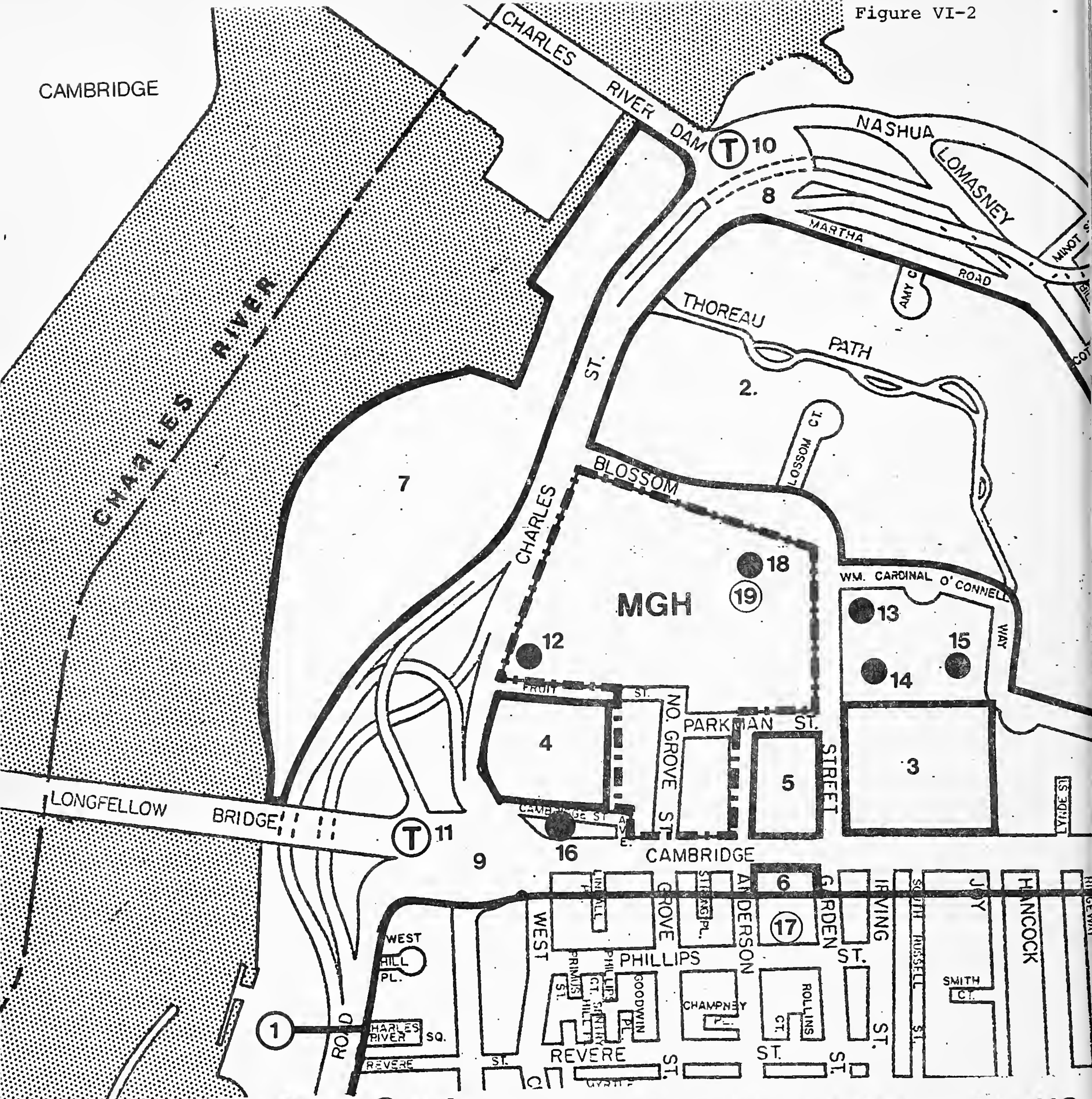
Development is planned, or under construction at a number of locations in the project area. (See Figure VI-2.)

Massachusetts Eye and Ear Infirmary: The MEEI is expected to complete its new building at the corner of Fruit Street and Charles Street Extension sometime during 1975. The new main entrance of MEEI will then be on Fruit Street. As Fruit Street will continue to be one-way towards Charles Street Extension, MEEI traffic will impose a small, but significant burden on North Grove and Fruit Streets. Continued use of the MGH parking garages and the MDC lots on Storrow Drive by MEEI staff and patients is not certain and changes in these parking facilities would pose tremendous problems for the area as a whole, unless replacement spaces were found or created.

Suffolk County Jail: A court order has mandated the closing of this facility in 1976, and the future of the parcel is under consideration. The City of Boston, which owns it, may decide to erect a new jail having two 12-story towers on the site. At the same time, the City of Boston, the CSCDC, and the MGH are negotiating a trade of the Suffolk County Jail site for the MGH parking lot on Nashua Street, a few blocks north. The jail site would thus be made available for residential, commercial, and hospital uses, or some combination thereof. The trade would also necessitate street improvement to service any of these more intensive land uses. All of the above plans conflict with the apparent intention of the Boston Landmarks Commission to declare the jail to be of historic significance and worthy of protection.

Charles Circle: The MDC recently commissioned a study on improving traffic movements at Charles Circle. These changes range from improved signalization to substantial realignment of Storrow Drive ramps and related traffic movements. Any of the schemes presented would improve vehicular accessibility to the project area, especially north of Cambridge Street. No preference has been expressed by the MDC for any scheme, and no timetable has been set for execution.

Figure VI-2

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# AREA DEVELOPMENT PLANS

**LEGEND:**

1. Beacon Hill Historic District
2. Charles River Park
3. Charles River Plaza
4. Suffolk County Jail
5. Parcel 4/B
6. Parcel 4/A
7. Charlesbank Playground
8. Leverett Circle
9. Charles Street Circle
10. Science Park MBTA
11. Charles Street MBTA
12. Mass. Eye & Ear Infirmary
13. Shriners Burn Institute
14. Blackstone Site
15. Regina Cleri
16. Boston Edison Switching Building
17. Phillips Street Playground
18. Bulfinch Building
19. Bulfinch Courtyard

FEBRUARY 1

CSCDC Parcel 4A: The former MGH Garage and adjacent properties on the south side of Cambridge Street are slated to become low-income housing in the near future. Preliminary designs are complete and an MHFA mortgage closing is expected in 1975. There will be 59 units, 14,900 square feet of commercial space, and 22 parking spaces in the new structure.

CSCDC Parcel 4B: Approximately 75 percent of this parcel is owned by the MGH and/or the CSCDC. Although no plans have been finalized, CSCDC is considering a multi-use development which could possibly include a hotel and recreation area. At one time, this parcel was considered as the site for the ACC.

Charles River Park: Construction is either complete or in progress on all but one parcel of the West End Urban Renewal Project. Two 364-foot high apartment towers now under construction should be available for 1976 occupancy, and the 1,200-car garage on Lomasney Way should be finished in 1975. The remaining parcel at the Lomasney Way/Staniford Street corner is being considered for hotel use, but no plans have been announced.

Blackstone Housing for the Elderly: This 14-story project will consist of 157 units with a few convenience stores on the ground floor. MHFA is expected to provide the mortgage and it should be ready for 1977 occupancy.

Impact of the ACC on Nearby Development Plans

From the discussion of land-use impacts, it is evident that the ACC itself would have no significant direct land use impacts. However, the ACC could influence other development plans through its visitors, traffic, and utility effects in the project area.

As indicated above, the CSCDC is in the process of developing plans for Parcel 4B which could include a hotel which would be used by hospital visitors to the MGH and MEEI. If patterns of patient care and policies on financial reimbursement were to change, some inpatients might also be treated as outpatients and be housed in a nearby hotel. Construction of the ACC will have little or no impact, by itself, on the development of a hotel on this site or any other (e.g., Cambridge St., Lomasney Way/Staniford St., Quincey Mashets, Haymarket Sq.) because it would not generate enough additional patients or visitors to support such a development. However, if there were almost enough demand for a hotel in the project area, construction of the ACC could make a new hotel economic.

Traffic: The project area currently experiences considerable traffic congestion and parking problems, resulting more from insufficient traffic controls and an inadequate parking policy than from the actual volume of traffic. (See Traffic and Parking section.) Construction of the ACC is not expected to significantly increase traffic volumes in the area and will therefore not constrain development for this reason. However, the existing conditions are such that they could discourage more intensive development of Parcel 4B and the Suffolk County Jail site if measures are not taken to improve them. This report recommends, in Chapter VII, the actions which need to be taken by various public agencies and private institutions, (including the MGH) to alleviate traffic problems and avoid adverse effects on future development.

Utilities: The ACC impact on utility supply and delivery is not expected to exceed capacity, according to utility suppliers' responses to requests for comment on estimated ACC demand loads. Thus it does not appear that the ACC would affect development of nearby land parcels because it overloaded utility lines.

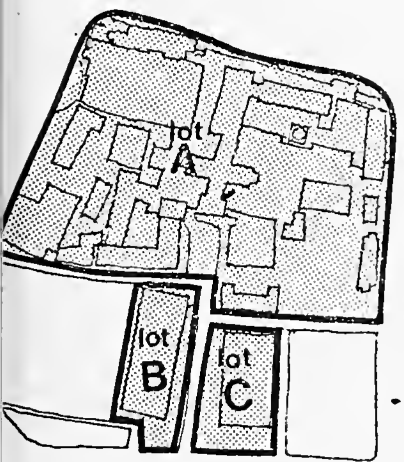
Floor Area Ratio

The need to apply for a zoning variance depends to some extent on the design of the ACC and to some extent on interpretation of law. The MGH is now in an H-4 zone in which the allowed floor area is four times the lot area, i.e., zoning allows for F.A.R. (floor area ratio) of 4. For F.A.R. calculations, the floor area is defined to include all enclosed spaces except mechanical areas and parking, which is an "accessory" use (e.g., an office building parking garage) occurring on the same lot; the lot area is defined as all continuous land area undivided by dedicated public streets. It should be noted that where both sides of a public street are in single onwerownership, the property owner may ask the City of Boston to close the street. In that circumstance, lot area on both sides of the street can be added together for purposes of F.A.R. computations; however, whether a parking garage is considered an "accessory" use or not is subject to legal interpretation.

At this point, it cannot be stated whether construction of an ACC would or would not require a zoning variance. Three major options limit the range of decisions, and the reasoning involved in each option is explored below.

Existing Conditions

At present the MGH main campus lot and floor areas are distributed as shown:




| Lot | Floor Area | Lot Area* | F.A.R. |
|---|---|---|---|
| A | 1,652,342 Sq' | 446,239 Sq' | 3.7 |
| B | 221,604 Sq' | 55,769 Sq' | 3.97 |
| C | 170,678 Sq' | 48,164 Sq' | 3.54 |

At present, it is possible to build an additional 132,614 square feet without exceeding an F.A.R. of 4 on Lot A.

| | |
|---|---|
| Lot A area | 446,239 Sq' |
| Allowed F.A.R. | X 4 |
| Total allowed floor area | 1,784,956 Sq' |
| Existing floor area | 1,652,342 Sq' |
| Additional floor area | 132,614 Sq' |

*Survey by William S. Crocker, Inc., Civil Engineers, February 8, 1965, revised July 1966.

Lots B and C contain the two MGH parking garages on North Grove Street. These garages are not presently considered accessory uses and hence count as floor area.

**Option 1: Assigning ACC to Lot A**

If an ACC were built, existing structures (Moseley, Walcott, Temporary Building #2, and the Waste Handling Shed) totaling 126,908 square feet would be removed from Lot A. The additional floor area allowed solely on Lot A for F.A.R. = 4 would amount to 132,614 + 126,908 = 259,522 square feet. The ACC program proposed in the Certificate of Need totals 350,000 square feet, or 320,250 square feet without mechanical spaces. Under this option, either a zoning variance must be applied for or ACC area must be reduced.

**Option 2: Assigning ACC Square Feet to Lots A and C**

Given the same conditions for building the ACC as in Option 1 above, with the additional condition that Parkman Street be closed, it is still not possible to build the ACC at 350,000 square feet without a zoning variance if the Parkman Street garage floor area is not included. The calculation follows:

| | | |
|---|---|---|
| Lot Area A | = | 446,239 Sq' |
| Lot Area C | = | 48,164 Sq' |
| Closed Parkman Street | = | 7,380 Sq' |
| Total Lot Area | = | 501,783 |
| Allowed F.A.R. | = | x 4 |
| Allowed Floor Area | = | 2,007,132 |
| Existing floor area Lot A | = | 1,652,342 |
| Existing floor area Lot C | = + | 170,678 |
| Total Existing floor area | = | 1,823,020 Sq' |
| Structures removed from Lot A | = - | 126,908 Sq' |
| Total future floor area | = | 1,696,112 |
| Allowed floor area | | 2,007,132 |
| Future floor area | = | 1,696,112 |
| Allowed for ACC | = | 311,020 |

Clearly, the ACC program in the Certificate of Need application would require a zoning variance under this option.

<u>Option 3: Parkman St. Garage is Considered an Accessory Use</u>

If the Parkman St. garage is considered an "accessory use," then the land area of the garage site is included in the calculations of the size of the site, but the floor area of the garage is excluded from the calculation of existing floor area. The calculation follows:

| | |
|---|---|
| Allowed floor area on Lots A & C (from above) | 2,007,132 |
| Future floor area without Parkman Garage | <u>1,525,434</u> |
| Allowed for ACC | 481,698 |

If the Parkman St. garage is considered an "accessory" use, 481,698 square feet would be available for an ACC and no-zoning variance would be necessary. Hence the need for a zoning variance will depend on the actual size of the ACC and on the legal interpretation of "accessory" use.

# TRANSPORTATION

## Traffic and Parking

### Current Conditions

A traffic impact area was defined to encompass the streets serving the Massachusetts General Hospital. These streets are shown in Figure VI-3. Table VI-1 shows the average daily traffic volumes for these streets in relation to their capacity.

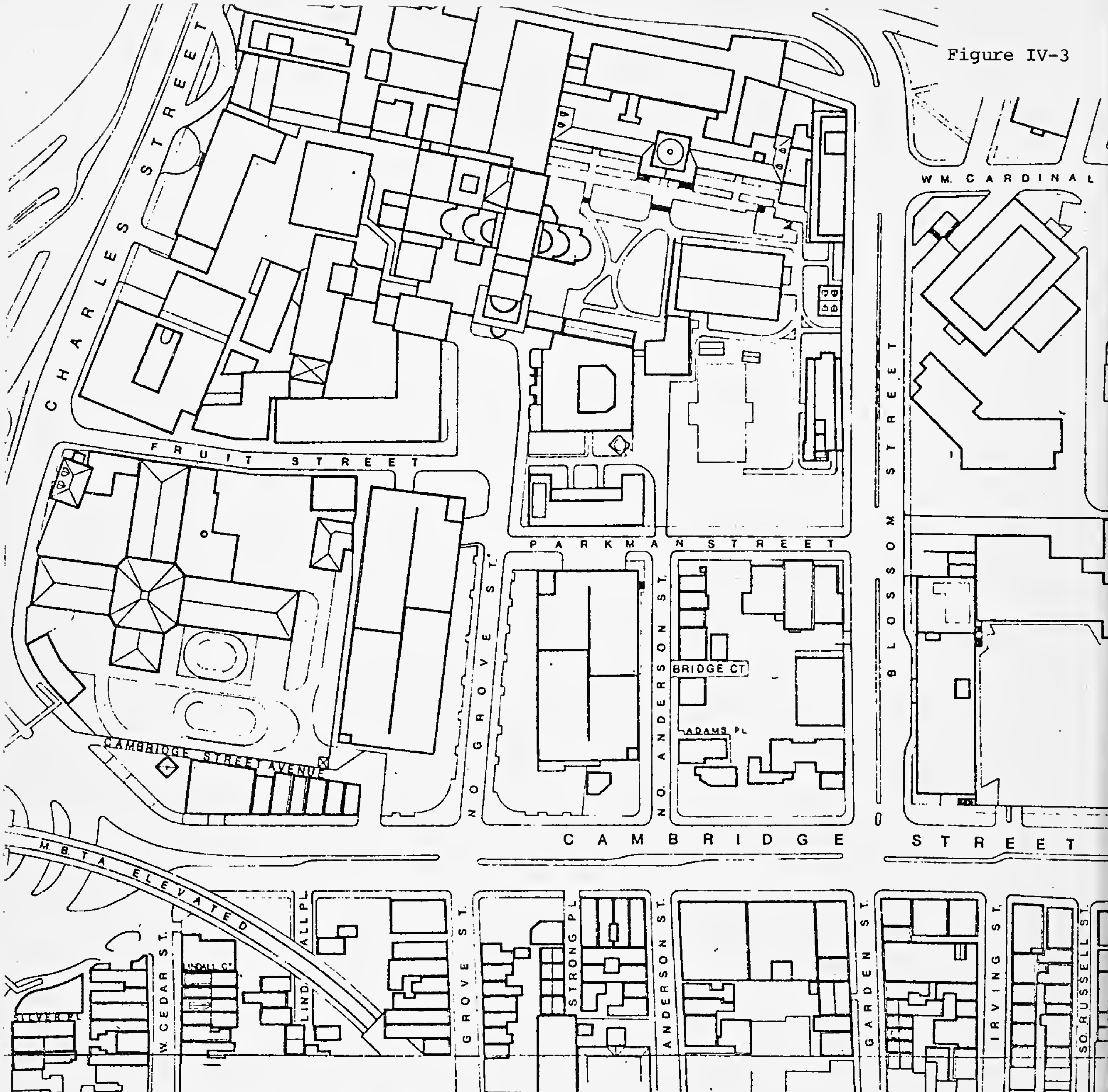
As can be seen from the table, none of the traffic volumes in the impact area exceeds the streets' daily capacity. All but Fruit Street and North Grove Street provide an acceptable or nearly acceptable level of service. Although the average traffic speeds seem low, they are not unusual for a dense urban area.

Peak hour traffic characteristics are generally more critical to traffic analysis and planning than average daily volumes. Traffic operating conditions are at their worst during the peak hour, and although the peak period lasts for a relatively short time, these "worst case" conditions are generally the bases for impact analysis and recommendations.

In the case of urban arterials, the capacity of a particular roadway is actually composed of two factors: the intersection capacity, and the mid-block capacity. In most cases, as in this study, the controlling capacity is the intersection capacity rather than the mid-block capacity. However, bottlenecks at locations other than intersections can also severely limit the capacity of an arterial street. Bottlenecks can occur at a rotary where vehicles are required to change lanes (weave) when entering or exiting the stream of traffic, as in Charles Circle.

In order to understand the source of the traffic problems in the vicinity of the hospital, peak period traffic was analyzed at four key intersections and compared with the analysis of the street traffic. This was done for the two highest afternoon peaks: the street peak and the hospital peak. Peak hour volumes and other operating characteristics were compared with the capacity of the road to determine the level of service for these intersections when traffic flow is the heaviest. The results of this analysis are shown in Table VI-2.

Figure IV-3

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## TRAFFIC IMPACT AREA

VI-14A

0 40 80 160 240 FEET

FEBRUARY

TABLE VI-1
TRAFFIC VOLUMES IN RELATION TO CAPACITY* AND LEVEL OF SERVICE**

| | Average Daily Volumes | Peak Hour Volume | Estimated Daily Capacity | Volume Capacity Ratio | Average Speed MPH | Level of Service |
|---|---|---|---|---|---|---|
| Cambridge St. | 35,000 | 2,500 | 45,000 | 0.77 | 20-25 | B-C |
| Blossom St. | 7,000 | 380 | 28,000 | 0.25 | 25-30 | A |
| N. Grove St. | 7,500 | 500 | 10,000 | 0.75 | 15 | D-E |
| Fruit St. | 1,600 | 50 | 3,500 | 0.45 | 15 | D-E |
| Charles St. | 15,000 | 900 | 20,000 | 0.75 | 20 | B-C |
| Parkman St. | 1,000 | - | 6,000 | 0.16 | 15-20 | C-D |
| Storrow Drive (Includes Charles St. Extension) | 98,000 | 6,600 | 100,000 | 0.98 | 15-20 | C-D |

Note: Capacity is calculated independently of Charles Circle and Leverett Circle, and assumes optimum flow conditions and existing geometrics.

* Capacity: The maximum number of vehicles that can pass over a given section of roadway or land in one direction during a given time period under prevailing roadway and traffic conditions. It is the maximum rate of flow that has a reasonable expectation of occurring. It is a variable quantity, and depends on a number of traffic and roadway conditions, including physical conditions and dimensions, parking regulations, traffic volumes, type of traffic control, turning movements, number of buses and trucks, and weather.

** Level of Service: A qualitative indicator of the operational qualities of a roadway or intersection

- Levels of Service A through C are acceptable, with Leval A being superior in that all traffic movements are the choice of the driver and not affected by anything else.
- Level B finds traffic movements beginning to become more restricted as choice of speed and lane operation are sometimes affected by other drivers.
- Level C operation provides satisfactory operating conditions but maneuverability is restricted.
- Level D is not acceptable if other schemes can be developed at reasonable costs. At this level, speeds are tolerable for only a short period of time.
- Level E allows the maximum possible number of cars to pass under extremely poor conditions and is highly undesirable.
- Level F is forced flow with very low speed and congestion.

TABLE VI-2
EXISTING PEAK HOUR LEVEL OF SERVICE
1975

| | Hospital Peak | Street Peak | Possible Street Peak |
|---|---|---|---|
| Cambridge St. at N. Grove St. | D-E | D-E | C |
| Cambridge St. at Blossom St. | C-D | D-E | C |
| Blossom St. at Parkman St. | A | A | - |
| Charles Circle | D | D-E | C |

A comparison of the peak hour level of service with the possible street peak suggests that the roadways themselves have the capacity to provide adequate service, but that other conditions at these intersections are intervening. The congestion at Charles Circle and Leverett Circle, mistimed and incorrectly installed traffic signals, and illegally parked cars are degrading peak hour traffic flow considerably over what could be provided under optimum conditions with the existing street system.

MGH Associated Traffic

Hospital Population: As indicated earlier in Chapter III, description of the ACC, there are approximately 13,400 persons with reason to be at the hospital on a daily basis. Of this total, approximately 7,000 are employees and the remaining 6,400 are patients and visitors. On an average day, approximately 10 percent of the staff total can be expected to be absent due to illness, vacations, or the flexible schedules of some of the medical staff. Thus, an average daily population at the hospital is more likely to be closer to 12,500.

Mode of Arrival: The following Tables VI-3 and VI-4 show the mode of arrival for the average daily hospital population, by category. As shown there, more than half of the people who come to the hospital arrive by private auto, and almost a quarter (23.7 percent) come by transit. Most of the remainder arrive by MGH shuttle bus, or walk, and about 6 percent come by taxi.

TABLE VI-3
NUMERICAL ESTIMATE OF DAILY ARRIVALS AT MGH BY MODE

| | Average Daily Population | Auto | Transit | Taxi | Other Mode (Walk, Bus, Bicycle) |
|---|---|---|---|---|---|
| Doctors and Interns | 800 | 600 | 58 | 16 | 128 |
| Staff - | | | | | |
| Administrative Medical | 5,289 | 2,485 | 1,429 | 212 | 1,163 |
| Inpatient Turnover and Associated Visitors | 480 | 280 | -- | -- | -- |
| Inpatient Visitors | 1,625 | 1,008 | 308 | 65 | 244 |
| Volunteers | 100 | 33 | 20 | -- | 47 |
| Business Visitors | 400 | 248 | 76 | 16 | 60 |
| Clinic Patients | 900 | 351 | 324 | 108 | 117 |
| Clinic Visitors | 485 | 189 | 175 | 58 | 63 |
| Private Patients | 1,285 | 706 | 295 | 168 | 116 |
| Private Visitors | 700 | 385 | 161 | 91 | 63 |
| Service Personnel | 100 | 100 | | | |
| Students and Others | 100 | 46 | 24 | -- | 30 |
| Total | 12,264 | 6,931 | 2,868 | 734 | 2,031 |

Source: Traffic Survey, Alan M. Voorhees and Associates, January 1975.

TABLE VI-4
PERCENT ESTIMATE OF DAILY ARRIVALS AT MGH BY MODE
(Percentages Averaged)

| | Percent Arrival By | | | |
|---|---|---|---|---|
| | Auto | Transit | Taxi | Walk, Shuttle, Bicycle |
| Doctors | 75 | 7 | 2 | 16 |
| Staff | 47 | 27 | 4 | 22 |
| Bed Visitors | 62 | 19 | 4 | 15 |
| Volunteers | 33 | 20 | 0 | 46 |
| Business Visitors | 62 | 19 | 4 | 15 |
| Students - Misc. | 46 | 24 | 0 | 31 |
| Private Patients | 55 | 23 | 13 | 9 |
| Clinic Patients | 39 | 36 | 12 | 13 |
| Total | 57 | 24 | 6 | 13 |

Source: Alan M. Voorhees & Associates, Inc., Survey, January 1975.

## Parking Requirements and Characteristics

The approximately 12,300 people who come to MGH every day drive more than 4,500 automobiles, as shown in Table VI-5. Slightly more than half (53 percent) of these cars are driven by doctors and employees of the hospital; the remainder of these cars are driven by visitors and patients.

The MGH presently issues parking stickers to hospital employees who wish to park regularly in designated garages. Four kinds of stickers are issued, at four different rates, with four different kinds of limitations, as shown below.

| Sticker Type | Number | Duration | Rate |
|---|---|---|---|
| House Staff | 387 | Unlimited | Free |
| Staff Doctor | 150 | Normally 9AM-5PM | $35.00/Month |
| Miscellaneous | 150 | Normally 9AM-5PM | $35.00/Month |
| General | 2000 | Normally No 9AM-12PM, Otherwise Unlimited | $7.50/Month |

Not all of these vehicles arrive on the immediate MGH campus because 1,000 employees park in the MGH lot near North Station and ride the shuttle bus to the campus, and 250 doctors park in the Cambridge St. and Charles St. garages. However, a significant number of employees move their automobiles at lunch time from the North Station lot to the campus garages, creating a demand for 250 additional parking spaces on campus. As a result, transient parkers must be turned away during the peak afternoon period, when demand for parking is the greatest.

A summary of parking conditions on and off campus indicates the following usage:

| | | |
|---|---|---|
| Daily Parking Requirement | 4,500 | |
| Parked Off Campus | -1,000 | North Station Lot |
| | - 170 | Cambridge and Charles St. Garages |
| | - 680 | Estimated Off Site |
| | +2,650 | |
| Moved from North Station | + 250 | |
| MEEI Patients and Visitors | + 100 | |
| Total Campus Useage | 3,000 | |

This figure is consistent with the survey of the Fruit and Parkman St. garages which showed average daily usage of 1,900 and 1,100 vehicles respectively.

TABLE VI-5
ESTIMATE OF TOTAL DAILY PARKING REQUIREMENTS, 1975

| | Average Daily Population | Persons By Auto Who Stay | Average Daily Autos |
|---|---|---|---|
| Doctors | 800 | 560 | 560 |
| Staff | 5,289 | 2,009 | 1,827 |
| Bed Patients and Visitors | 2,105 | 975 | 850 |
| Volunteers | 100 | 33 | 33 |
| Business Visitors | 400 | 240 | 240 |
| Students | 100 | 41 | 27 |
| Private Patients and Visitors | 1,985 | 1,053 | 681 |
| Clinic Patients and Visitors | 1,385 | 457 | 297 |
| Service Personnel | 100 | 100 | |
| Total | 12,264 | 5,468 | 4,515 |

Use of the Campus Garages: A limited parking survey was conducted to determine who uses the Parkman and Fruit Street garages and how long they stay. Three thousand cars are parked in the two garages on campus daily. The larger Fruit St. garage handles over 1,900 of the total, while the Parkman St. garage accommodates only 1,100. The high turnover rate in the Fruit St. garage allows parking of more cars than Parkman, which serves primarily employees. The users of the garages and the duration of their stay are shown in the tables below.

TABLE VI-6
USE OF PARKMAN AND FRUIT STREET GARAGES

| | Parkman Street | Fruit Street |
|---|---|---|
| Employee | 73% | 28% |
| See Doctor | 4 | 18 |
| Treatment/Test | 3 | 14 |
| Visit Patient | 9 | 28 |
| Business | 3 | 3 |
| Other | 8 | 9 |
| User Destination | MGH 98<br>Other 2 | MGH 96<br>MEEI 3<br>Other 1 |

TABLE VI-7
DURATION OF STAY AT PARKMAN & FRUIT STREET GARAGES

| | Parkman Street | Fruit Street |
|---|---|---|
| Less than 1 Hour | 5% | 23% |
| 1 to 2 Hours | 7 | 30 |
| 2 to 3 Hours | 6 | 16 |
| 3 to 4 Hours | 5 | 9 |
| Greater than 4 Hours | 77 | 22 |
| | 100 | 100 |
| Average Stay 4 Hrs. | 2.1 Hrs. | 1.9 Hrs. |
| Average Stay Overall | 4.9 Hrs. | 2.8 Hrs. |

Arrival and Departure Characteristics: Arrival and departure rates, shown below were calculated for both the Fruit Street and Parkman Street garages for a 24-hour weekday period.

| | Parkman Street | Fruit Street |
|---|---|---|
| Peak Arrival Hour | 7 - 8 AM | 9 - 10 AM |
| Peak Departure Hour | 4 - 5 PM | 3 - 4 PM |
| Peak Accumulation Hour | 12 - 1 PM | 10 - 11 AM |

The earlier arrival at the Parkman Street garage reflects the effect of employee shift change in the above tabulations; at Fruit Street, the effect of predominantly transient parkers is also reflected in the analysis.

In summary, of the 1,350 garage spaces available, only 200 to 500 are now accessible to the general public over the course of the day. Approximately 850 to 1,150 spaces are occupied daily with low turnover, long stay, and low revenue staff and employee parking.

1980 Traffic on External Roadways

Daily and peak period traffic volumes were projected to 1980 for Cambridge, Blossom, and Charles streets, and Storrow Drive. The projections are based on current growth rates for the Boston Metropolitan Region - published in the Eastern Massachusetts Regional Planning Report - information from the Boston Traffic and Parking Department, and data from the Boston Transportation Planning Region and the Eastern Massachusetts Transportation Planning Study. Projections were not made for North Grove, Fruit, or Parkman, since traffic on these streets is not indicative of area growth but of onsite hospital development characteristics.

Table VI-8 displays the traffic volumes projected for the major circulation streets in the traffic impact area. On a daily basis, none of the streets is expected to carry traffic volumes in excess of its estimated capacity.

However, during periods of high traffic flow, especially on Storrow Drive and Charles Circle, operating conditions tend to decay, producing congestion and delay which are not readily reflected in the analysis of average daily volumes. Therefore, peak hour conditions were analyzed at four crucial intersections - along Cambridge Street

at North Grove and Blossom streets, at Blossom and Parkman, and at Charles Circle. In 1980, the levels of service for these intersections are expected to be as shown in Table VI-9.

In 1980, as now, the roadways themselves would have the capacity to provide adequate service, but congestion from inadequate traffic control systems and poorly designed intersections will degrade peak hour traffic operating conditions for short periods of time.

<u>1980 Traffic Under the No Build Alternative</u>

The no build alternative assumes that the only significant hospital growth will occur in the number of outpatient visits. The number of staff, doctors, employees and hospital business is expected to remain constant under this assumption for two reasons. First, the hospital has no present plans to expand medical staff and support personnel beyond the existing level; second, within the current structure of clinic and private care, the growth in outpatient care is constrained by both staff and space limitations.

By 1980, campus population will increase by approximately 262 persons daily over existing 1975 conditions (See Table III-7). This will raise the total number of automobiles from 4,515 in 1975, to 4,571 in 1980. This increase is very small, and reflects the constraints on staff and patient growth resulting from space limitations.

<u>1980 Traffic Under the Certificate of Need Alternative</u>

The Ambulatory Care Center would slightly increase its staff and annual outpatient visitation. The growth in outpatient care would come about as a result of the increased efficiency of doctor and staff resulting from the new facility. However, patient visitation would still be limited by the fact that the doctors can see only a limited number of patients in a day. (See project description in Chapter III.)

Construction of the ACC would increase the campus population by approximately 863 over existing levels and by 601 over projected 1980 levels. The growth would increase the number of cars to 4,797 - 282 more vehicles than at present and 226 more vehicles than those projected for the MGH under the no build assumptions. A comparison of these three conditions is shown below. It is apparent that the increase in vehicular traffic from 1975 to 1980 if the ACC is built, would be a very small percentage of the total hospital activity.

TABLE VI-8
PROJECTED 1980 CONDITIONS ON EXTERNAL STREETS

| | Estimated Daily Volume | Estimated Daily Capacity* | Volume Capacity Ratio | Average Speeds | Anticipated Levels of Service |
|---|---|---|---|---|---|
| Cambridge St. | 38,000 | 45,000 | 0.84 | 15-20 | C |
| Blossom St. | 7,700 | 28,000 | 0.28 | 25-30 | A |
| Charles St. | 16,300 | 20,000 | 0.82 | 15-20 | C |
| Storrow Drive | 99,000 | 100,000 | 0.99 | 15-20 | C-D |

*Capacity is estimated independent of Charles and Leverett Circle, and assuming optimum flow conditions.

TABLE VI-9
PEAK HOUR LEVELS OF SERVICE, 1980

| | Hospital Peak | Evening Street Peak | Possible Street Peak |
|---|---|---|---|
| Cambridge St. at N. Grove St. | D-E | D-E | C |
| Cambridge St. at Blossom St. | D | D | C |
| Blossom St. at Parkman St. | A | A | A |
| Charles Circle | D | D-E | C |

TABLE VI-10
AUTOMOBILE INCREASE UNDER 1980 BUILD AND NO BUILD ASSUMPTIONS

| | Average Daily Automobiles | Vehicle Increase | Percent Increase |
|---|---|---|---|
| 1975 | 4,515 | -- | -- |
| 1980 | | | |
| No Build | 4,571 | 56 | 1.24% |
| Build | 4,797 | 282 | 6.24% |

To analyze the impact of this additional traffic, the volumes were added to the projected 1980 volumes for the external roadways. Additional traffic volumes were also assigned to North Grove Street under the no build and Certificate of Need alternatives. The additional traffic burden on the streets in the traffic impact area is shown in Table VI-11.

TABLE VI-11
EXISTING AND PROJECTED TRAFFIC VOLUMES BY STREET

| Street | 1975 Volumes | 1980 No Build | 1980 Certificate of Need |
|---|---|---|---|
| Cambridge | 35,000 | 38,056 | 38,282 |
| Charles | 15,000 | 16,316 | 16,385 |
| Blossom | 7,000 | 7,700 | 7,700 |
| Storrow Dr. | 98,000 | 99,016 | 99,085 |
| N. Grove | 7,500 | 7,556 | 7,782 |
| Parkman | 1,000 | 1,000 | 1,000 |
| Fruit | 1,600 | 1,600 | 1,600 |

The average daily traffic increases, under both the build and no build assumptions, fall within the normal range of daily fluctuations of 1980 street traffic. These increases will have little effect on traffic flow over the course of the entire peak period. Level of service at the four critical intersections - Cambridge St. at N. Grove St., Cambridge St. at Blossom St., Blossom St. at Parkman, and at Charles Circle -

will also continue unchanged, over the 1980 assumptions.

See p. D-8, response 3.

Under both assumptions - build and no build - traffic conditions during peak periods would be comparable to the conditions which exist today. During peak periods, congestion and delay would characterize Charles Circle and the intersection of North Grove and Cambridge Streets. Within the North Grove Street courtyard, and the entrance to the White Building, the problems of uncontrolled vehicle movement, vehicle-pedestrian conflicts, and emergency vehicle access would continue.

### 1980 Parking Requirements

Since the major part of the traffic increase would result from patients and patient visitors, and not employees, the increase in demand for parking spaces in 1980 under assumptions of build or no build would be minimal. A breakdown of the requirements indicates additional space needs as shown in Tables VI-12 and VI-13.

When this 1980 information is compared with the parking space now available, it is apparent that the additional parking required necessitated by the ACC would be small, but would add to the current deficiency. The existing peak parking requirement of 2,835 cars, when weighed against a supply of 2,320 spaces, leaves an absolute deficit of 515 spaces. This is complicated by the fact that approximately 250 cars are moved from the North Station lot to the garage, causing visitors to be turned away, and causing a relative deficit of 765 cars. If the ACC were built, the peak space requirement would rise to 2,949, leaving a deficit of 629 spaces. If the 250 automobiles expected to be moved to the garage are added, there would be a relative deficit of 879 parking spaces.

The ACC alone will require parking for 746 vehicles, of which 114 (2,949-2,835) would have to be new spaces if the present mode split and vehicle occupancy level continues. The ACC parking requirement of 746 is 25 percent of the total campus requirement of 2,949 vehicles. About 53 percent of these parkers would be patients and visitors, and the remainder would be employees connected with the ACC specifically. Virtually all of these employees and most of these patients are already associated wtih the MGH.

TABLE VI-12
TABULATION OF ADDITIONAL PARKING NEEDS, 1980 WITH AND WITHOUT ACC

| | Additional People | Additional Autos | Turnover | Spaces Required |
|---|---|---|---|---|
| WITH ACC | | | | |
| Private Patients | 349 | 189 | 3.0 | 62 |
| Clinic Patients | 204 | 67 | 3.0 | 23 |
| Doctors' Patients | 25 | 18 | 1.0 | 18 |
| Employees | 30 | 11 | 1.0 | 11 |
| Accompanying | 242 | -- | -- | -- |
| Service | 10 | -- | -- | -- |
| TOTAL | 860 | 282 | -- | 114 |
| WITHOUT ACC | 262 | 56 | | 18 |

TABLE VI-13
DAILY PARKING REQUIREMENTS, 1975 AND 1980

| | 1975 | 1980 No Build | | 1980 Build | |
|---|---|---|---|---|---|
| | Existing | Increase | Total | Increase | Total |
| Number of Autos | 4,515 | 56 | 4,571 | 282 | 4,797 |
| Total Peak Space Requirements | 2,835*** | 18 | 2,853 | 114 | 2,949 |
| Campus Peak Space Requirements | 2,115 | 18 | 2,053 | 114** | 2,229 |
| Total Parking Supply | 2,320 | | 2,320 | | 2,320 |
| Absolute Deficit | 515 | | 533 | | 629 |
| Relative Deficit* | 765 | | 783 | | 879 |

*Includes 250 cars moved from North Station lot to garages.

**Assumes employee portion of increase will park on campus.

***Includes ±200 cars associated with MEEI and other uses.

**Conclusions**

In conclusion, the existing traffic and parking conditions at the MGH are the major problem, not the additional requirements brought about by the construction of the ACC. The results of this study, examination of previous studies, interviews with people in the city and state knowledgable about the problems, and responses received at two public meetings have identified the following traffic problems in the vicinity of the MGH hospital, apart from the ACC.

- Cambridge Street congestion
- Congestion due to Charles River Plaza garage
- Underutilization of Blossom Street
- Conflicts between travel modes (pedestrians, ambulances, taxis, trucks, private cars) and functions (service, emergency, employee, visitor, business, patient), especially in the White Building courtyard
- Ambulance access hindrance due to traffic mix, inadequate signalization, congestion, and illegal parking
- Illegal parking and nonenforcement, especially regarding compliance with tow zone regulations in critical areas (e.g., North Grove Street)
- Inefficient and inadequate signalization and signal operation on Cambridge Street and potential for solutions
- Pedestrian access problems, especially
    - sidewalk widths
    - circuitous routings
    - weather exposure
    - changes of grades (steep stairways)
    - vehicular conflicts
    - poor connection to Charles transit station
    - width of streets and traffic volumes
- Parking problems
    - paid vs. free parking demand
    - amount of available parking
    - evaluation of user/cost problems for parking facilities - cheap enough to keep cars from cruising local streets seeking free parking, but not so cheap as to encourage use of cars vs. public transportation

- Public transit use and accessibility

  -- use of existing buses from three MBTA lines (Red, Blue, and Green) and existing parking facilities

  -- potential for encouraging employees to use public transit.

Although vehicle generation and parking space demand would increase slightly with the ACC, and the consolidation and relocation of ACC employees would concentrate more traffic in the vicinity of the new building, these are not the major traffic issues that have to be addressed. The traffic impacts of the ACC would be so small that they would fall within the range of fluctuations that can be expected in day-to-day traffic patterns.

Nevertheless, construction of the ACC offers the hospital and the relevant public agencies an opportunity to alleviate some of these existing problems. The traffic circulation discussion in Chapter VII of this report presents the schemes that have been identified to date to solve these problems.

## Transit Accessibility

### MBTA Service

Transit accessibility to MGH is presently via the MBTA's Red, Green, and Blue Lines. The nearest stations for these transit lines and the distances from the stations to the nearest MGH entrance are as follows.

| Line | Station | Distance (Feet) | Nearest Entrance |
|---|---|---|---|
| Red | Charles | 800 | Clinics |
| Green | Science Park | 1,350 | Gray |
| Blue | Bowdoin | 2,350 | White |

There is no MBTA bus service in the hospital's vicinity. Commuter rail service to North Station is 1/4 mile away.

Clearly, Charles Station is the most convenient to the hospital, and therefore the heaviest used by MGH-bound riders. It is an elevated station located in the Charles Circle rotary. Pedestrian bridges with stairs at both ends conduct transit users crossing over the vehicular traffic in Charles Circle to sidewalks on adjoining blocks.

However, the presence of the staircases restricts transit use by any outpatients or visitors with mobility problems due to age or infirmity, or due to the use of a mobility aid such as crutches or a wheelchair.

Another problem of transit usage, weather exposure, is significant because both the stations and pedestrian bridges are weather-exposed at Charles and Science Park. Thus, for pedestrians, waiting in the stations and walking on the bridges is uncomfortable during cold weather and high winds, and it is hazardous when icing conditions prevail.

Other problems with MBTA service include the generally run-down and occasionally crowded condition of the system, limitations on system coverage, and the requirement for transferring between lines. The MBTA has a capital improvement program underway which will improve the physical comfort, capacity, reliability, and efficiency of the existing system. Projects presently in motion that may lead to early improvements in access to MGH include:

- Red Line extensions to Braintree and Arlington
- New rolling stock for Green and Blue lines
- Station modernization
- Orange Line extension to Melrose and Malden
- Green Line signal system modernization
- Commuter rail improvement program.

Transit usage for MGH visitors is very low, although frequency of service is high on all lines (3 to 5 minutes in peak hour and 7 to 8 minutes during the off-peak period), and fares are low (25¢ per trip other than during Dime Time, when dime fares are in effect, and 10¢ for the handicapped and elderly). Employees, visitors and patients use transit for their trips to MGH 23 percent of the time, whereas transit usage by all daily tripmakers with downtown Boston destinations is about 45 percent or almost double the MGH usage.

The pattern of transit usage, revealed by the survey conducted for this study, indicates that it is a person's level of income that influences their use of public transit to travel to MGH. This influence of a person's income (ability to pay) is, of course, a reason common to the population at large. As shown below, those with presumably lower incomes (clinic patients) use the MBTA system more than do those with presumably higher incomes (e.g., private patients, bed patient visitors, doctors). Those traveling to MGH who arrive by public transit include the following transit users, listed below

as a percent of daily MGH-bound persons in various categories:

| | |
|---|---|
| Clinic Patients and Visitors | 36% |
| Staff | 27 |
| Students, Miscellaneous | 24 |
| Private Patients and Visitors | 23 |
| Volunteers | 20 |
| Business Visitors | 19 |
| Bed Patient Visitors | 18 |
| Doctors/Interns | 7 |

**Shuttle Service**

A private shuttle service, carrying approximately 2,400 passengers per day, serves the MGH campus. A fleet of four 15-passenger "Pace Arrow" vans (each transporting up to 25 passengers, including standees) are owned by MGH. These vans are used to provide shuttle service which operates between the North Station parking lot located on Nashua Street, the MGH, the Bunker Hill Community Health Center located in Charlestown, and the "Blood Bank" entrance to the Gray Building on Blossom Street. The main purpose of these shuttles is to transport hospital employees between remote parking areas and the MGH campus, and between the campus and outlying MGH-operated clinics.

The shuttle service is subsidized by the hospital as a courtesy service and operates free of charge. By MBTA regulation, under which the service operates, the shuttle makes no intermediate stops between the Nashua Street parking lot, Bunker Hill clinic, and the hospital. A notice to this effect is posted in each bus. During the peak hour, the frequency of service averages about 8 trips to the North Station lot, and one trip per hour to Bunker Hill. Service frequency to the North Station lot drops to half, or 4 trips per hour in the off-peak periods. The service operates to the lot between the hours of 5:30 AM and 12:10 AM, and between 9:00 AM and 2:00 PM to Bunker Hill. While the service obviously operates mainly for the convenience of employees who park at North Station, there is doubtless some minor usage of the service by Boston & Maine rail service commuters who travel from campus to North Station, by walk-ins from surrounding neighborhoods, and by transferees from the Orange and Green lines who disembark at the North Station stop on Causeway and Canal streets.

### Impact Assessment

Construction of the ACC will increase the number of transit and shuttle bus riders insignificantly, and will therefore have no impact on these services. However, increased transit service usage offers the following advantages to the hospital:

- Reduces the requirement to furnish parking space for patients, employees, and visitors
- Promotes reduction of congestion and air pollution in the vicinity of the hospital
- Maintains the hospital's accessibility in a period of increasing gasoline taxes and prices and a shortage of petroleum that will grow over the years
- Improves the hospital's accessibility for those not presently able to use transit or those who would find it advantageous to do so in the future.

The initiatives that the MGH might take to achieve these advantages are described in Chapter VII.

## Pedestrian Circulation

### Existing Conditions

According to the traffic survey conducted during this study, approximately 4,900 persons, or 40 percent of the daily accumulation of persons on the MGH campus, walk to the complex from a distance greater than the distance between the garages and entrance curb loading zones. In other words, whether by transit, bicycle or walking, their trip at the MGH end requires negotiating the hazards, conflicts and inconveniences of the pedestrian approaches to MGH, i.e., narrow sidewalks, circuitous routes, weather exposure, grade changes, and hazards of vehicular conflict. These hazards are due to wide streets, high traffic volumes, and lack of pedestrian push-button signals, which are available but not energized.

The traffic survey conducted for this study indicated that about 42 percent of MGH visitors currently use the White Building entrance, 16 percent use the Clinics Building entrance, and 15 percent use the Gray Building entrance. All other entrances are used less than 10 percent of the time. For the greatest effect, improvement of pedestrian access should focus on these entrances, and especially those of the White and Clinics buildings where most of the problems of foot travel are evident.

Impact Assessment

Construction of the ACC will add an insignificant number of pedestrians to the MGH campus and will therefore have no impact on pedestrian circulation. However, the existing conditions are such that recommendations have been made in Chapter VII for improving pedestrian access.

ENERGY UTILIZATION

See p. D-21.
response (8)

The ACC would be heated with steam provided by Boston Edison. It is projected that the ACC would exert a demand for 87,220,000 pounds of steam per year. Steam space heating is used throughout all MGH buildings and was selected for the ACC because it is clean and hookups are available. Uncertainties about the future availability of oil and natural gas make steam heating particularly attractive for the hospital. Boston Edison has indicated that they would have the capacity to serve the ACC.

Building standards published by the American Society of Heating, Refrigeration and Air Conditioning Engineers would be consulted in designing the building for efficient energy utilization.

The demand for electricity in the ACC is projected to be 6,090,000 kilowatt hours in order to operate air conditioning, lighting, and equipment. In the event of a power failure, the MGH emergency generator would be able to provide emergency lighting in the corridors and stairwells of the ACC.

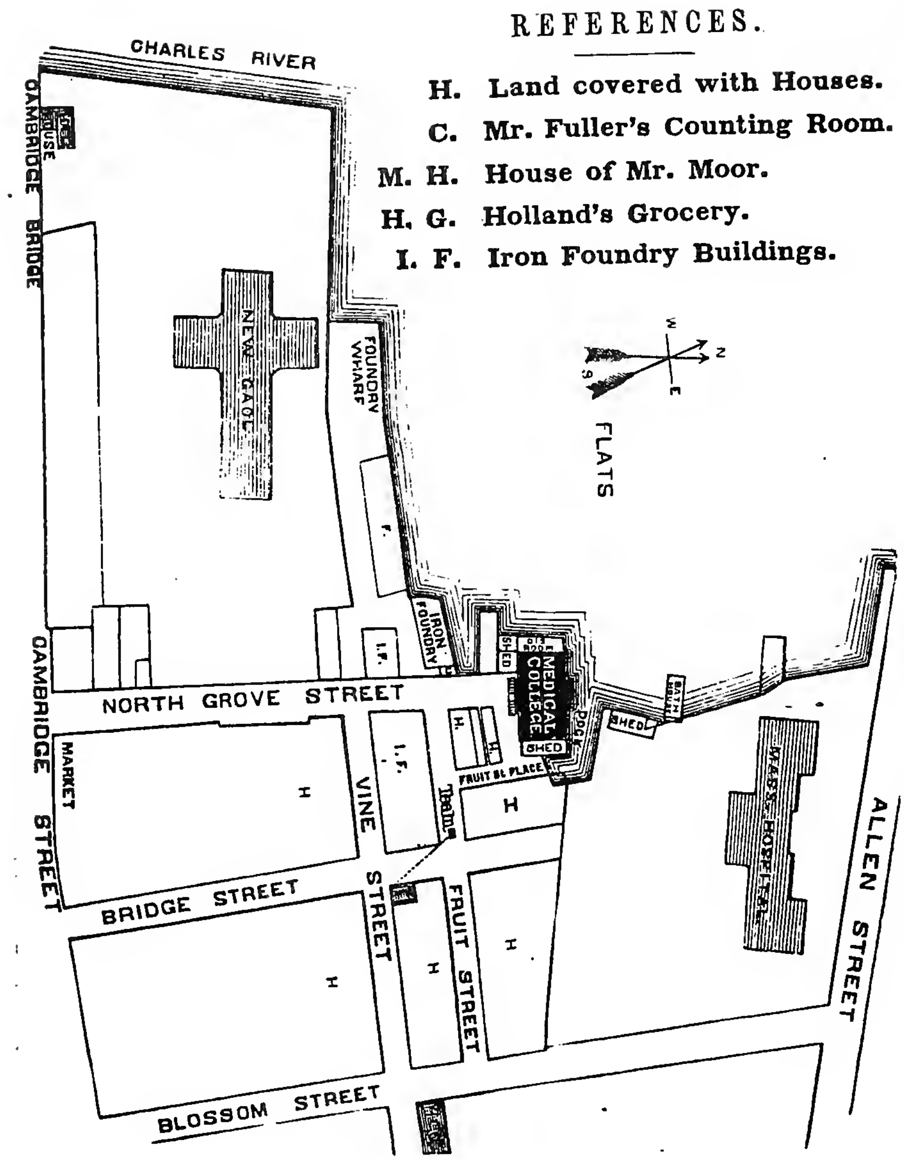
## SUBSURFACE CONDITIONS: GEOLOGY AND HYDROLOGY

As at many locations in and around Boston, the present ground surface on which much of the MGH campus is built has been created by extensive land filling on what were once coastal wetlands. In this area, the original colonial shoreline formed an identation or cove, at which boats were docked to bring patients to the Bulfinch Building, the original Massachusetts General Hospital. Figures VI-4 and VI-5, depict the original shoreline. Its configuration with respect to the present hospital buildings is shown in Figure VI-6.

The site for the proposed ACC lies just inside the colonial shoreline. A subsurface geologic and hydrologic study was performed for the project by Haley and Aldrich, Inc. (see Appendix B). This study was primarily based on records of soil borings available from the MGH. The location of these borings is shown in Figure VI-7.

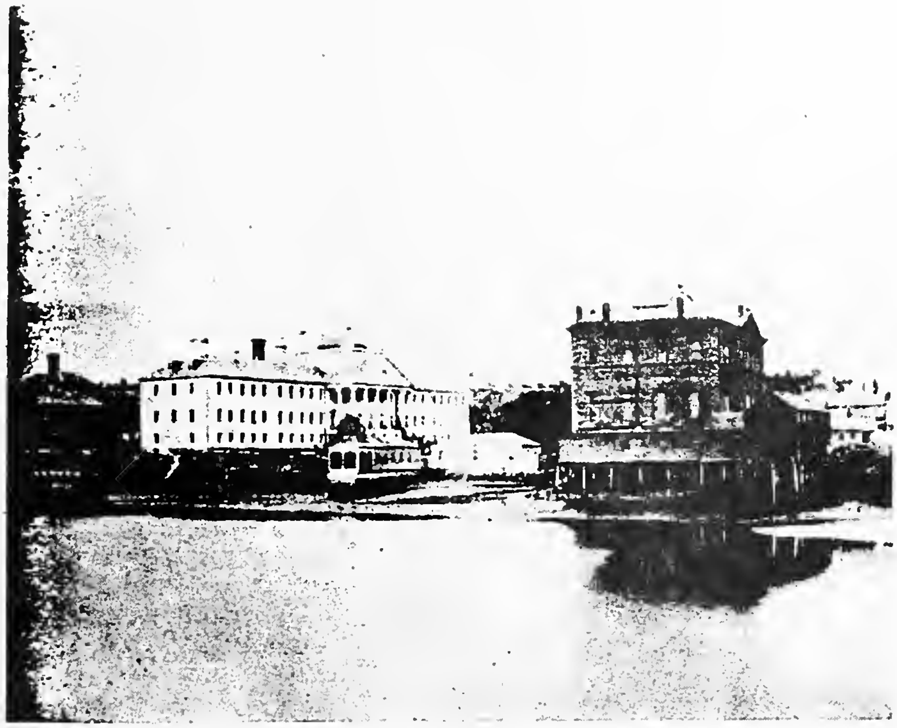
Little data are available on soil conditions directly beneath the Moseley and Walcott buildings, where the proposed ACC would be located. However, several borings, made immediately adjacent to the proposed site on the west, allowed for construction of a generalized soil profile assumed to be representative of the site area.

Figure VI-8, the generalized soil profile, indicates that fill of varying composition extends approximately 10 feet below the ground surface. The nearly level surface is about 17 feet above the Boston City Base (BCB), a standardized reference point for the Boston area fixed below the previous low-water mark. Immediately below the fill there is a layer of organic silty sand of 5 to 10 feet in thickness. This layer was deposited when the area was a coastal wetland, and extends to a depression of 2 feet below the BCB. Below the organic soils in a layer of stiff inorganic clay, 10 to 20 feet in thickness, immediately underlain by a softer inorganic clay layer about 40 feet in thickness. These last two layers are both "Boston Blue Clay," an inorganic marine deposit found throughout much of the Boston area that varies considerably, here and elsewhere, in its properties. Beneath the clay is a glacial till deposit, a heterogeneous assortment of gravel, sand, silt, and clay-sized particles. The glacial till, beginning at around elevation - 60 feet BCB, is of indeterminate thickness, but is assumed to be underlain directly by bed-rock. The lower surface of the organic silty sand and clay layers



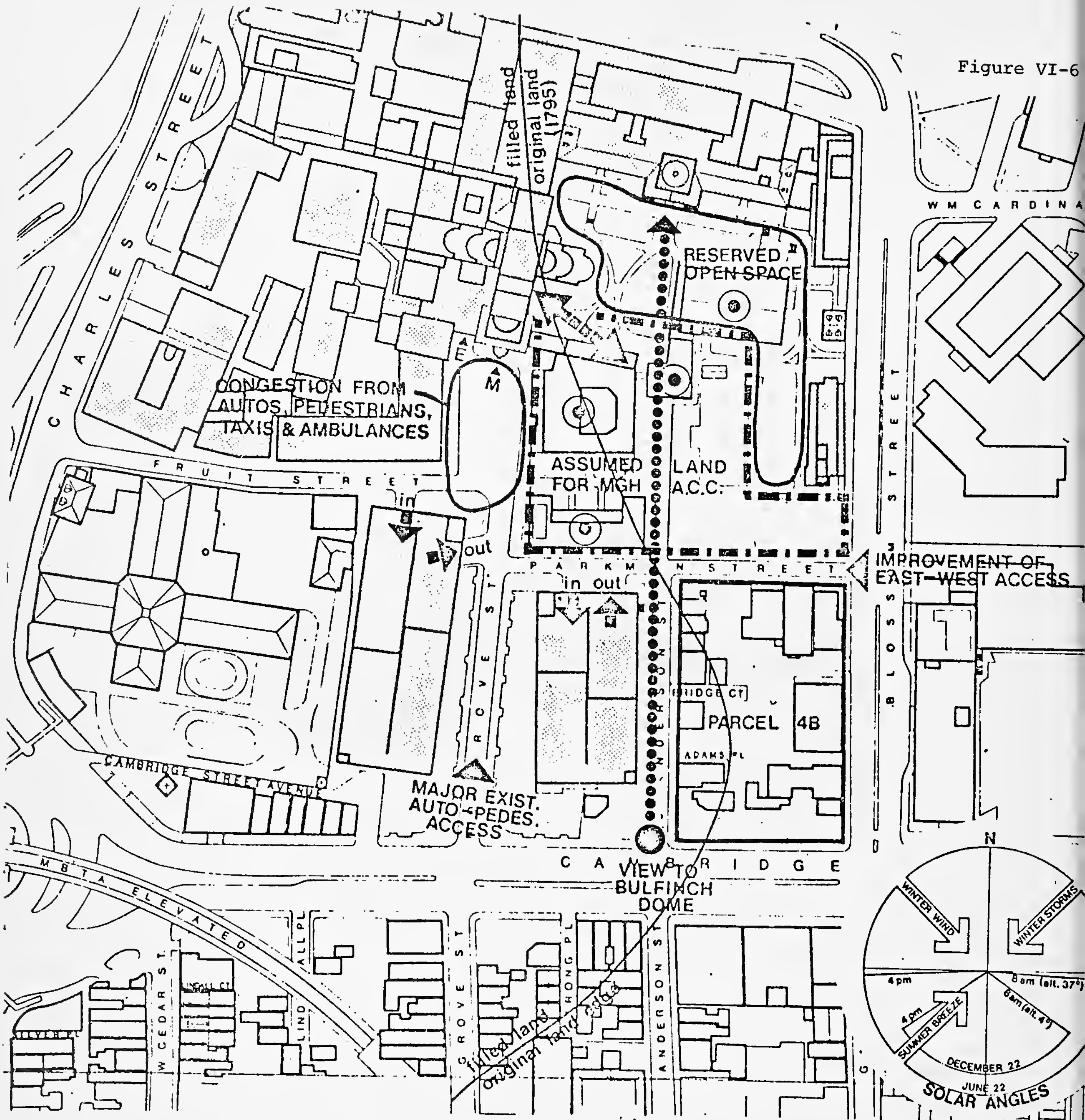

Map showing the location of the Medical College in the West End

Reprinted by permission from Murder at Harvard, Helen Thomson, Houghton Mifflin, Boston, 1971.



The Massachusetts General Hospital and the Medical College across the street

Figure VI-6




# Ambulatory Care Center
## Environmental Impact Report

Prepared for

**Massachusetts General Hospital**
**C.S.C.D.C.**
**Massachusetts D.P.H.**

Prepared by

Resource Planning Associates, Inc.

in association with

Wallace, Floyd, Ellenzweig, Moore, Inc.
Alan M. Voorhees and Associates, Inc.

# SITE CONSTRAINTS & CRITICAL FACTORS

REMOVABLE BUILDINGS

CRITICAL CONNECTION (ACC-WHITE)

M EXISTING MAIN ENTRY

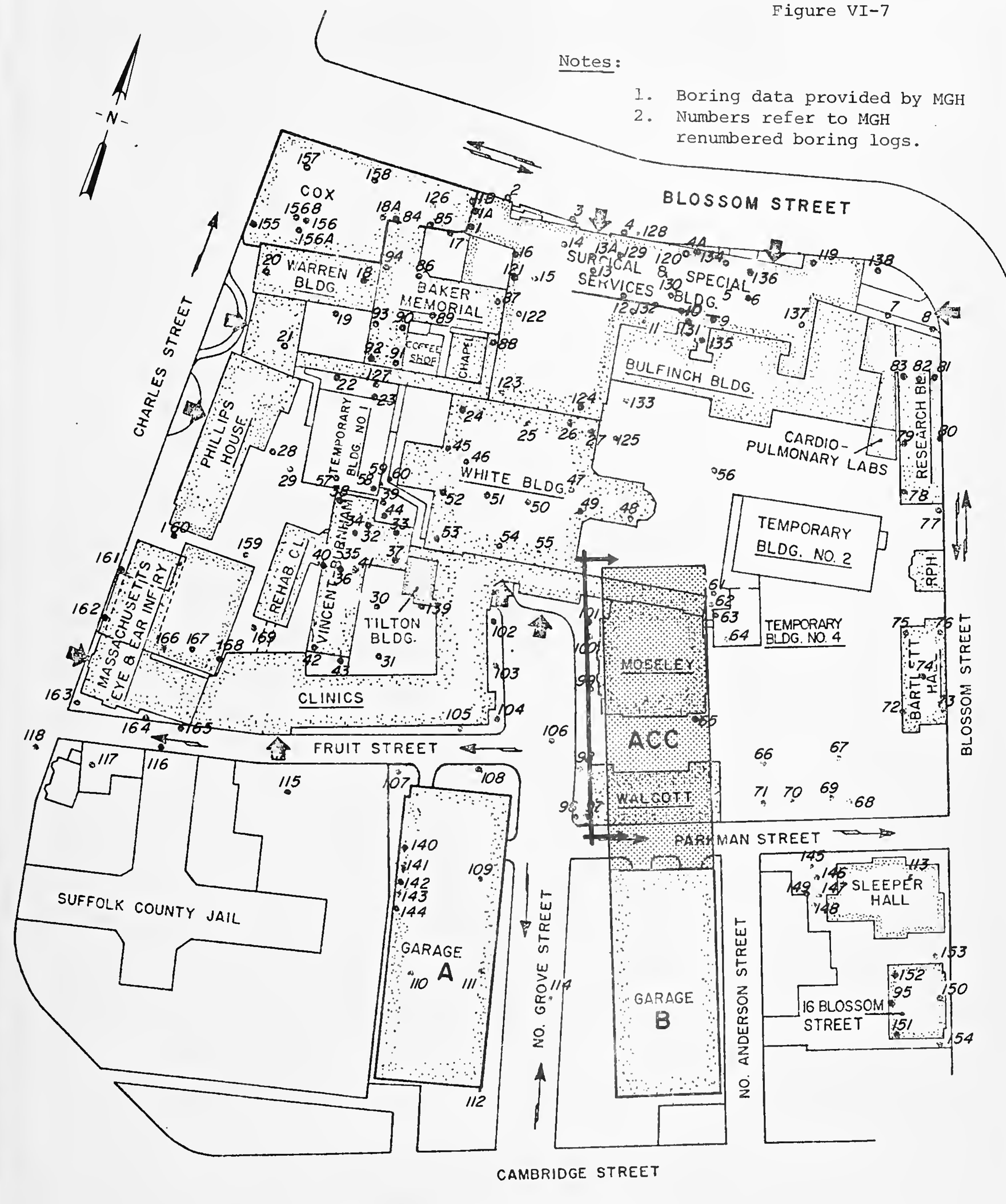
E EMERGENCY VEHICLE ENTRANCE

0 40 80 160 340 FEET

Figure VI-7

Notes:

1. Boring data provided by MGH
2. Numbers refer to MGH renumbered boring logs.




## BORING LOCATION PLAN

MASSACHUSETTS GENERAL HOSPITAL

BOSTON, MASS.

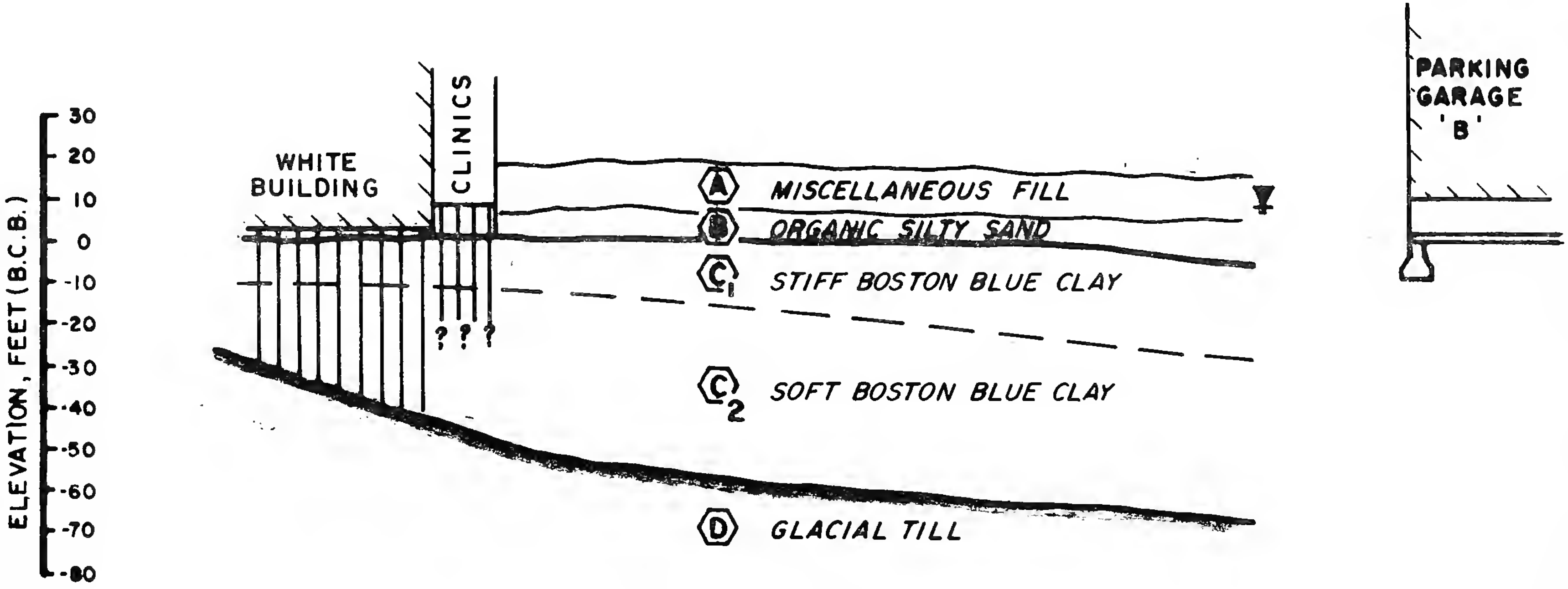
DRAWN
APRIL 9, 1958

REVISED
JANUARY 1972 APRIL 4, 1973 JULY 22, 1974

HALEY & ALDRICH, INC.

FILE NO. 3576

Figure VI-8




Note: Soil profile generalize for boring data available from Massachusetts General Hospital.

MASSACHUSETTS GENERAL HOSPITAL
BOSTON, MASSACHUSETTS
**GENERALIZED SOIL PROFILE**

0 25' 50' 75' 100'

FEBRUARY 1975

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

slopes downwards toward the south. Figure VI-9 indicates the elevation of the top of the natural inorganic soil (the Boston Blue Clay) with reference to the BCB.

Groundwater conditions of the site have not been studied in detail, but records at MGH indicate that mean groundwater levels are approximately +8 BCB, or approximately 8 to 10 feet below the ground surface. Yearly variations of about 4 feet mean that groundwater may rise to a seasonal high-water table of approximately 4 to 6 feet below ground surface. MGH buildings in the area have water-proofed basements, but have occasionally had seepage problems that have required increasing the amount of water-proofing.

## Foundations of Existing Buildings

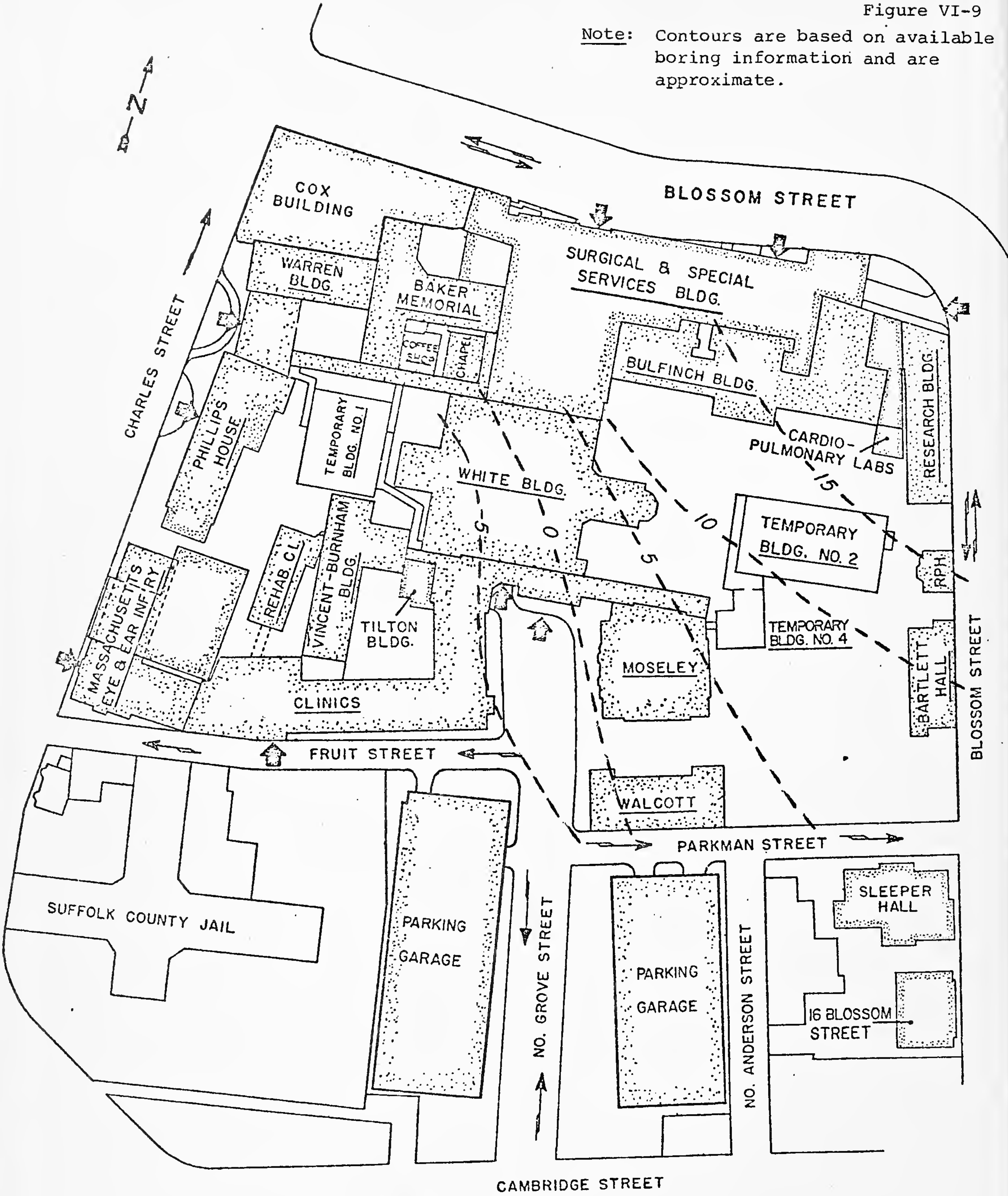
Due to the existence of organic soils on and around the ACC proposed site, many of the MGH buildings are founded on piers or piles bearing on the stronger underlying deposits. The following table, based primarily on construction drawings available at MGH, summarizes foundation conditions for buildings in the area.

TABLE VI-14
MGH BUILDING FOUNDATIONS
AND BEARING MATERIALS

| Building | Foundation Type | Probable Bearing Material |
|---|---|---|
| White | Step-taper piles and caissons | Glacial Till |
| Moseley | Wood Piles | Clay |
| Walcott | Wood Piles | Clay (?) |
| Clinics | Wood Piles | Clay |
| Garage A | Caissons | Clay |
| Garage B | Spread Footings or Caissons | Clay |
| Bartlett Hall | Spread Footings | Clay |
| Bulfinch | Spread Footings | Clay |

Figure VI-9

<u>Note:</u> Contours are based on available boring information and are approximate.




CONTOUR PLAN
TOP OF NATURAL INORGANIC SOIL

MASSACHUSETTS GENERAL HOSPITAL
BOSTON, MASS.

DRAWN APRIL 9, 1953 REVISED JANUARY 1972 APRIL 4, 1973 JULY 22, 1974

HALEY & ALDRICH, INC.

The most critical constraint for future construction in the area is the Clinics Building which is founded on wooden piles that are below the permanent water table. Lowering of the water table must be avoided to prevent these piles from drying out and decaying.

<u>Probable ACC Foundation System</u>

Preliminary analysis of subsurface soil conditions and building geometry has led to the tentative conclusion that the ACC can be founded on a reinforced concrete mat bearing on the stiff clay existing at the proposed lowest floor elevation. Such a "raft foundation," as it is commonly termed, is feasible because excavation for the two sub-basements of the building would remove a sufficient weight of soil to reduce settlement of the supporting clay layer (and the ACC itself) to within tolerable limits. Due to groundwater conditions, the basement area should be waterproofed and the mat foundation structurally designed to resist hydrostatic uplift pressures. This can be done by either using a thicker concrete mat or through design of the internal reinforcement of the mat.

Construction of the proposed basement area will also require lateral support of the surrounding soils and dewatering of the excavated area. The most probable lateral support system would be steel sheet piling, with construction dewatering handled by conventional pumping from dumps inside the excavation.

<u>Impact of the Concrete Mat Foundation on Subsurface Conditions</u>

The construction of the ACC would probably result in minor settlement of buildings supported by the clay stratum within approximately 50 feet of the proposed structure, primarily the Clinics Building and Parking Garage B. The ACC itself will also settle slightly due to long-term consolidation of the underlying clay. Based on what is now known of the engineering properties of the underlying soils, the settlements will be within tolerable limits for all of these structures. However, the intention to connect the ACC to the White Building and Parking Garage B will probably result in some differential settlement of the ACC at the interfaces with these buildings. Design measures are available to allow the ACC to accommodate such differential settlement. Therefore, no damage due to differential settlement will occur to either the ACC itself, buildings adjoining it, or surrounding utilities.

The construction of a concrete mat foundation will produce only minimal vibrations from operation of trucks, cranes, and related equipment, and no damage due to such vibration is anticipated.

The recommended waterproofing of basement areas and design to resist hydrostatic uplift pressures will allow construction of the ACC without causing any significant change in long-term groundwater levels.

Therefore, prevention of damage to the adjacent Clinics Building, founded on wooden piles, will be ensured. Dewatering operations for foundation construction should not cause any detrimental effects, as only minor groundwater lowering would be anticipated outside of the excavation area.

<u>Impacts of Alternative Foundation Systems</u>

It should be noted that the geological studies conducted to date are preliminary in nature. Detailed design-phase geotechnical engineering studies will still be necessary to analyze site conditions and soil engineering properties, and to precisely calculate probable settlements. The results of these studies might suggest a different foundation system (i.e., deep driven piles) or a different approach to lateral earth support for excavation dewatering. The impacts of these alternatives are discussed below.

<u>Deep Piles</u>

If the detailed geotechnical studies indicate that the ACC would be subjected to adverse long-term settlements with a mat foundation, the probable foundation system would then be deep piles, bearing on the underlying glacial till or bedrock. If properly designed, the system would not create any adverse affects on the foundations of neighboring structures. The adjacent White Building, and the new MEEI Building, have been constructed on piles without causing damage to adjoining buildings.

<u>Soldier Piles and Wood Lagging</u>

Use of vertical steel "soldier piles" and horizontal wood lagging would be effective means for lateral earth support and excavation dewatering if no water-bearing sands are present on the site. This approach would create less noise than driving sheet piles because holes could be pre-augered and the vertical piles could be set in concrete. (See noise impacts for further discussion.) However, this method does not provide as efficient

foundation dewatering as sheet piling. In addition, if water-bearing sands are present, construction dewatering would probably require the use of deep exterior well points to dewater the sands. To minimize the possibility of damage to surrounding utilities and structures supported on the clays (such as the Clinics Building), a groundwater recharge system might also be required to maintain groundwater levels outside the excavation. Under these circumstances, soldier piles and lagging (which would involve a 10 percent increase in construction costs even without more extensive dewatering) would definitely not be preferable.

Slurry Trench

Another alternative for excavation dewatering would be a reinforced concrete diaphragm wall constructed by the "slurry trench" technique. The wall, of thick reinforced concrete, would completely encircle the site. This method would minimize noise and construction dewatering. Use of the "slurry trench" technique would involve an approximate cost of \$18 to \$20 per square foot for excavation as opposed to approximately \$13-15 per square foot for a sheet piling excavation. This is an increase of approximately 50 percent. Depending on the final design requirements for the ACC, it may be possible to use the "slurry wall" as a basement wall which would carry part of the load of the basement floors, but not of the main structure. If this could be accomplished, the total cost of the foundation would be reduced over one built using sheet piling during excavation. Alternatively, the potential reduction in foundation costs that such a design represents could be offset by the cost of internal finishing of the rough-surface slurry wall which would probably be required if the basement of the ACC were to contain the computer center, as currently planned.

A final decision on the excavation support system cannot be made until the detailed design phase. The "slurry trench" technique appears to offer the best combination of foundation support and noise control and would be the best choice if its use is financially feasible and does not interfere with the design requirements of the ACC.

Measures to Minimize Harm

Controlling the impact of a proposed large structure such as the ACC on geologic and hydrologic conditions is primarily a matter of proper foundation design and construction techniques. No adverse affect on subsurface conditions of adjoining structures is anticipated from construction of the ACC, by either the concrete mat or deep driven pile foundation, providing that careful geologic and hydrologic studies are conducted.

## NATURAL RESOURCES

As may be expected in a heavily urbanized area, no mineral deposits of any value exist in the project area and the fauna and flora which are present are only those which accompany human settlement.

Existing fauna include cats, dogs, and other domestic pets, and such vermin as rats, mice, and insects. Existing flora include a number of different species of trees, the vast majority of which were planted for landscaping amenity. Based on field survey, there are 15 large deciduous trees: oak, horse chestnut, and beech on the main MGH campus. Other vegetation consists of smaller deciduous trees and shrubs, evergreen shrubs, grass and a variety of weeds.

Construction of the ACC would not affect the animal population. Of the 15 large deciduous trees, only one would be affected by construction of the ACC. Of the small deciduous trees on North Grove Street, one between Moseley and Walcott would have to be removed to construct the ACC, and a dozen or so smaller deciduous or evergreen shrubs would have to be removed also. Construction of the ACC would, however, present the opportunity to open up and relandscape the Bulfinch courtyard. Thus, the ACC presents an opportunity to increase the number, variety, and landscape amenity of vegetation in the area.

## UTILITY INFRASTRUCTURE

Existing water main, storm and/or sanitary sewer, gas, steam, and electric services are densely packed under the streets and open spaces of the MGH campus (see Figure VI-10). Construction of the proposed ACC would slightly increase demand for most utilities and physically impact a number of existing utility lines.

### Projected Utility Loads

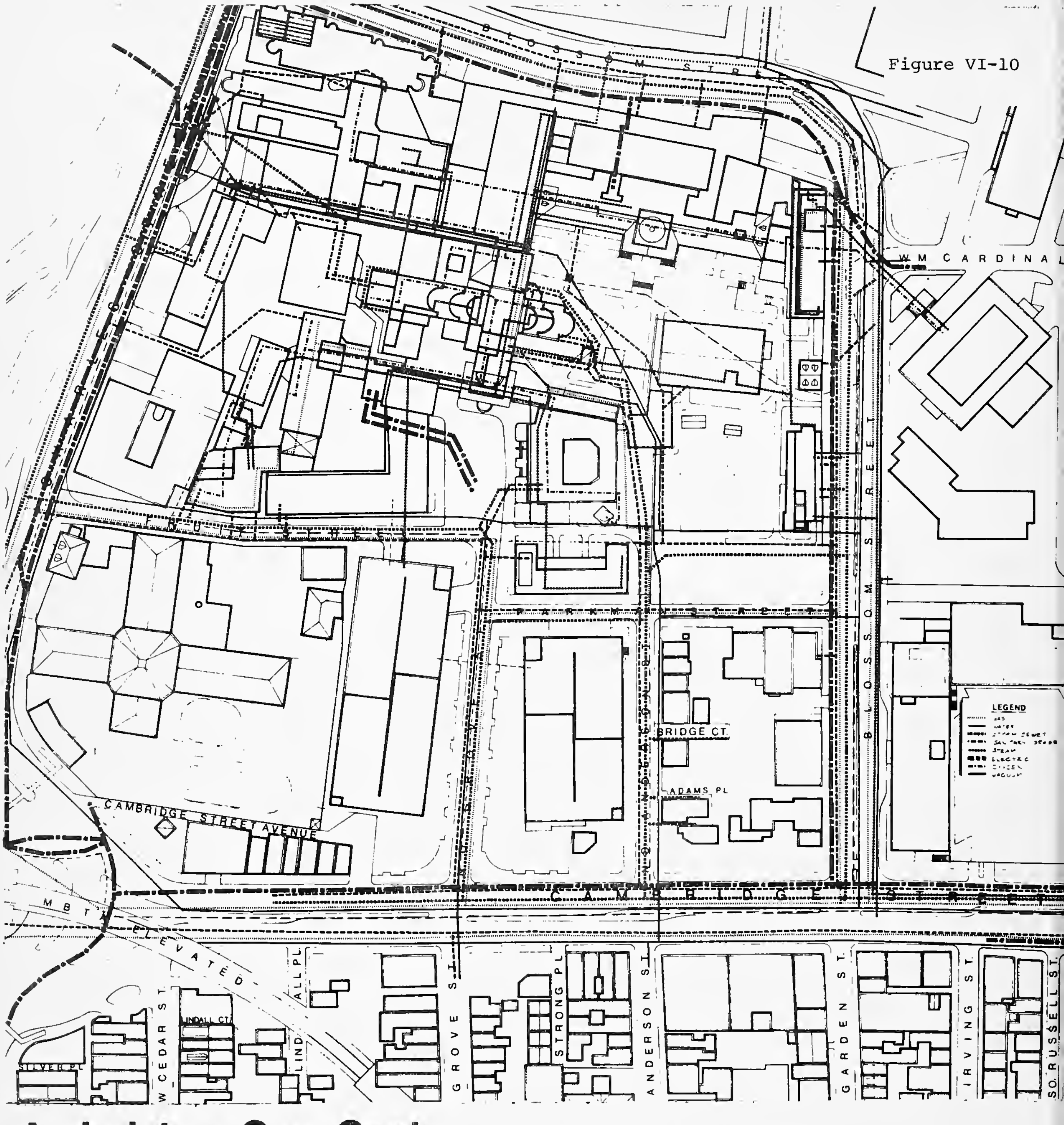
Lacking a building design or equipment specifications, an estimation of utility loads due to ACC operation necessarily involves approximations. It is possible either to use average demand figures established by mechanical engineers for medical office buildings, or to derive existing ratios of use to gross square-foot area at MGH. The latter approach is used in this study, as it is assumed to more accurately reflect MGH building management practices than do the national average demand figures.

The analysis will consist of several steps. First, existing and 1980 MGH utility loads will be estimated for the no build alternative; second, ACC operation loads will be projected; and third, total 1980 MGH loads with the ACC are predicted. This will make it possible to evaluate the specific and cumulative effects of constructing the ACC on area utilities.

Projected MGH Demands Without ACC (1980): Under the no build alternative, utility demands at MGH, tempered by such energy conservation measures as prove feasible in a hospital context, can be expected to continue trends established during the past few years. Steam, gas, and electric demand have remained essentially stable for the past 3 years of the MGH, and will most likely continue this pattern or decline slightly under a no build policy. During the past 4 years, water and sewer usage has shown an unusual pattern - a slow decline from 33,700,000 cubic feet (cu. ft.) in 1971 to 32,800,000 cu. ft. in 1973, followed by a sharp increase to 39,200,000 cu. ft. in 1974. No unusual events occurred in 1974 to account for the sudden increase. Hence, the 1980 MGH water usage is projected as a range, using the 1971-1973 average for the low estimate, and 1974 usage as a high estimate. Based on these trends, then, the following projections have been made.

- For estimating water, sewage, gas, and steam usage, a gross square footage of 1,906,068 has been used. Garages are not included since they do not require water, sanitary sewage, gas, or steam service.

Figure VI-10




# Ambulatory Care Center
## Environmental Impact Report

Prepared for

**Massachusetts General Hospital**
**C.S.C.D.C.**
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Prepared by

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## UTILITY LINES

0 40 80 160 240 FEET

FEBRUARY 197

- For electric demand estimates, garages are included in the MGH gross square footage of 2,298,300.

Thus, predicted 1980 MGH utility demands without the ACC would be as shown in Table VI-15.

Projected MGH Demands with ACC (1980): If the ACC is built as described in the Certificate of Need application, total MGH utility demands in 1980 will be greater than under the no build alternative. The same kind of computation is used to predict demand with the ACC, but the gross square footage (gsf) must be adjusted. The following projections have been made.

- Construction of the ACC entails removal of 128,383 gsf of existing structures (Moseley, Walcott, Temporary Building No. 2).

- For water, sewer, and steam demands, the gsf basis becomes (1,906,068-128,383+350,000) = 2,127,685 gsf.

- For gas, the gsf basis become (1,906,068-128,383) = 1,777,685 gsf (there will be no gas in the ACC).

- For electricity, the gsf basis becomes (2,298,300-128,383+350,000) = 2,519,917 gsf.

Thus, total MGH utility demands in 1980 would be as shown in Table VI-16.

Projected ACC Demands

ACC water, sewage, steam, and electric demands are estimated by applying existing MGH use/gsf ratios to the ACC gross square footage of 350,000. (Gas will not be used in the ACC). This procedure slightly overstates expected demands since the ACC will not be open 24 hours per day as would an inpatient care facility. Projected utility demands of ACC operation are shown in Table VI-17.

The City of Boston, MDC, and Boston Edison were asked by letter if capacity exists to supply the additional loads required by the ACC. All replies have been positive. The comparison in Table VI-18 shows that, in 1980, construction of the ACC would increase water and sewer usage by 10.5 percent, steam usage by 10.5 percent, and electricity demand by 9.6 percent, but decrease gas usage by 9.3 percent.

The cumulative impacts of the ACC include such increases in pollution as are associated with the generation of additional steam and electricity, increased loads on sewage treatment facilities, and the affects of increased utility loads on neighboring uses. The first two impacts are addressed in this study in discussion of air quality and water quality, while local affects are dealt with separately below, including a presentation of an inventory of utility lines on the ACC site (Table VI-19).

At present, the area surrounding MGH is experiencing utility problems - sewer backups at Regina Clery, and low water pressure on Beacon Hill. The Water Quality section of this report describes in detail how the proposed 1978 MDC interceptor sewer upgrading will provide the extra capacity needed to prevent backup problems. Additionally, it is worth noting on Figure VI-10 (existing utilities map) that the ACC would not load sewers on which its neighbors depend. The low water pressure problem on Beacon Hill appears to be independent on conditions on the MGH side of Cambridge Street.

Whether the ACC would foreclose future land uses on neighboring parcels by using up "spare" utility capacity is difficult to determine without extensive study of supply and delivery systems and proposed future uses. Predicting 1980 utility supplies is problematical because it involves foreign policy, utility plans, as well as plans of other users. The existing delivery network suggests that the ACC could only affect neighboring parcels such as the Suffolk County Jail site and CSCDC Parcel 4B, which are connected or connectable to utility networks at several points. Given the existing network and proposed improvement plans, construction of the ACC would not, by itself, exceed water, sewer, steam, and electricity supplies available in the area.

<u>Physical Utility Impacts</u>

The ACC site shown in the Certificate of Need application occupies the area from the White Building to the Parkman Street Garage. This area is now occupied by the Moseley and Walcott buildings, the closed section of Fruit Street, and a length of Parkman Street. As can be seen on the existing utilities map (Figure VI-10) and in the foregoing Table VI-19, a number of utility lines run down the already mentioned sections of

Fruit and Parkman streets as well as east of the Moseley and Walcott buildings. Construction of the ACC would conflict with the continued functioning of all these lines except the oxygen tank. The latter has to be expanded and relocated independently of and prior to any ACC construction.

<u>Measures to Minimize Harm</u>

Since all the utilities available under Fruit and Parkman streets are also accessible from North Grove and North Anderson streets and the unaffected sections of Parkman and Blossom streets, these lines could be abandoned and the ACC built without affecting any users' service. In the interest of maintaining the flexibility provided by existing interconnections, it is advisable to relocate the sanitary sewer, water main, and gas lines under a realigned Parkman Street. The water, sewer, gas, and steam lines northeast of the Moseley Building would have to be realigned to clear ACC foundations and maintain MGH service.

TABLE VI-15
1980 MGH UTILITY DEMAND WITHOUT THE ACC

| Utility | MGH 1974 Use | Gsf Basis | Use/Gsf/Yr. | MGH Demand 1980 |
|---|---|---|---|---|
| Water | 39,200,000 cu. ft. | 1,906,068 | 18.25-20.57 | 34,785,740-39,200,000 cu. ft. |
| Sewer | 39,200,000 cu. ft. | 1,906,068 | 18.25-20.57 | 34,785,740-39,200,000 cu. ft. |
| Steam | 475,000,000 lbs. | 1,906,068 | 249.2 | 475,000,000 lbs. |
| Gas | 8,700,000 cu. ft. | 1,906,068 | 4.56 | 8,700,000 cu. ft. |
| Electric | 40,000,000 kwh | 2,298,300 | 17.4 kwh | 40,000,000 kwh |
| Steam, peak hr. | 98,400 lbs. | 1,906,068 | 0.052 | 98,400 lbs./hr. |
| Electric, peak hr. | 7,400 kwh | 2,298,300 | 0.0032 | 7,400 kwh |

TABLE VI-16
1980 MGH UTILITY DEMANDS WITH THE ACC

| Utility | Use/Gsf/Hr. | Gsf Basis | Demand with ACC 1980 |
|---|---|---|---|
| Water | 18.25-20.57 cu. ft. | 2,127,685 | 38,830,250-43,766,480 cu. ft. |
| Sewer | 18.25-20.57 cu. ft. | 2,127,685 | 38,830,250-43,766,480 cu. ft. |
| Steam | 249.2 lbs. | 2,127,685 | 530,219,102 lbs. |
| Gas | 4.56 cu. ft. | 1,777,685 | 8,106,240 cu. ft. |
| Electric | 17.4 kwh | 2,519,917 | 43,846,560 kwh |
| Steam, peak hr. | 0.052 lbs. | 2,127,685 | 110,640 lbs. |
| Electric, peak hr. | 0.0032 kwh | 2,519,917 | 8,060 kwh |

TABLE VI-17
PROJECTED UTITY LOADS FOR THE ACC

| Utility | Use/Gsf/Yr. | Gsf Basis | Projected ACC Demand 1980 |
|---|---|---|---|
| Water | 18.25-20.57 cu. ft. | 350,000 | 6,387,500-7,199,500 cu. ft. |
| Sewer | 18.25-20.57 cu. ft. | 350,000 | 6,387,500-7,199,500 cu. ft. |
| Steam | 249.2 lbs. | 350,000 | 87,200,000 lbs. |
| Electric | 17.4 kwh | 350,000 | 6,090,000 kwh |
| Steam peak hr. | 0.052 lbs. | 350,000 | 18,200 lbs. |
| Electric, peak hr. | 0.0032 kwh | 350,000 | 1,120 kwh |

TABLE VI-18
COMPARISON OF 1980 MGH UTILITY DEMANDS

| Utility | MGH Without ACC | MGH with ACC | Percent Change |
|---|---|---|---|
| Water (cu. ft.) | 34,785,400-39,200,000 | 38,830,250-43,766,480 | +10.5% |
| Sewer (cu. ft.) | 34,785,400-39,200,000 | 38,830,250-43,766,480 | +10.5% |
| Steam (lbs.) | 475,000,000 | 530,219,102 | +10.5% |
| Gas (cu. ft.) | 8,700,000 | 8,106,240 | - 9.3% |
| Electric (kwh) | 40,000,000 | 43,846,560 | + 9.6% |
| Steam, peak hr. | 98,400 lbs. | 110,640 lbs. | +12.4% |
| Electric, peak hr. | 7,400 kwh | 8,060 kwh | + 8.9% |

TABLE VI-19
INVENTORY OF UTILITY LINES ON ACC SITE
(Pipe Size in Inches)

| Location | Water | Sewer | Storm | Gas | Steam | Electricity | Oxygen |
|---|---|---|---|---|---|---|---|
| Fruit St. | 10 | 12 | none | none | 4 | none | yes |
| Parkman St. | none | 12 | yes | 6 | no | none | none |
| Moseley/Walcott | 8 | 10 | yes | 6 | 10 | none | none |

## WATER QUALITY

### Existing Conditions

Storm and sanitary sewage from the MGH and its neighbors in the North End, West End, Beacon Hill, Bay Village, and Back Bay contribute to the pollution of the Charles River. All runoff and sewage from these areas are collected by sewerage designed and built in the last quarter of the nineteenth century. The West Side Interceptor was constructed in 1878 to intercept and divert combined storm and sanitary sewage from the Charles River to the Boston Main Drainage system which now leads to the Deer Island Sewage Treatment Plant. It is 17,382 feet long, and flows in a westerly direction roughly parallel to the Charles River.

The Boston Marginal Conduit was constructed parallel to the West Side Interceptor, but runs in the opposite direction. It accepts overflows via seven connectors from the Interceptor and discharges below the Science Museum Dam into Boston Harbor during low tide. (See Figures VI-11 and VI-12.) A 1972 study by Process Research, Inc. indicated that the West Side Interceptor runs at overcapacity, even in dry weather, so that the Boston Marginal Conduit is almost constantly carrying untreated combined sewage to Boston Harbor. Because the Boston Marginal Conduit lies in low, flat land, and the tide gates function poorly, tidewater intrudes, filling up part of the pipe's capacity and thereby decreasing the carrying capacity from 125 million gallons per day (mgd) to between 50 and 70 mgd.* During wet weather, the capacity of the Marginal Conduit is exceeded and the overflow is emptied directly into the Charles River via five outlets located at Hereford, Dartmouth, Berkeley, Pinckney, and Fruit streets. (See Figure VI-13.) These outfalls contribute to the polluted condition of the Charles River, which, in turn, is a major pollutor of Boston Harbor. The C.E. Maguire engineering report on the Charles River Estuary Pollution Control Facilities for the Commonwealth of Massachusetts Metropolitan District Commission in 1972 estimated that 12.9 mgd of sanitary sewage flows through the conduit to be discharged, untreated, into Boston Harbor and, of this amount, 2.5 mgd is first discharged into the Charles River.

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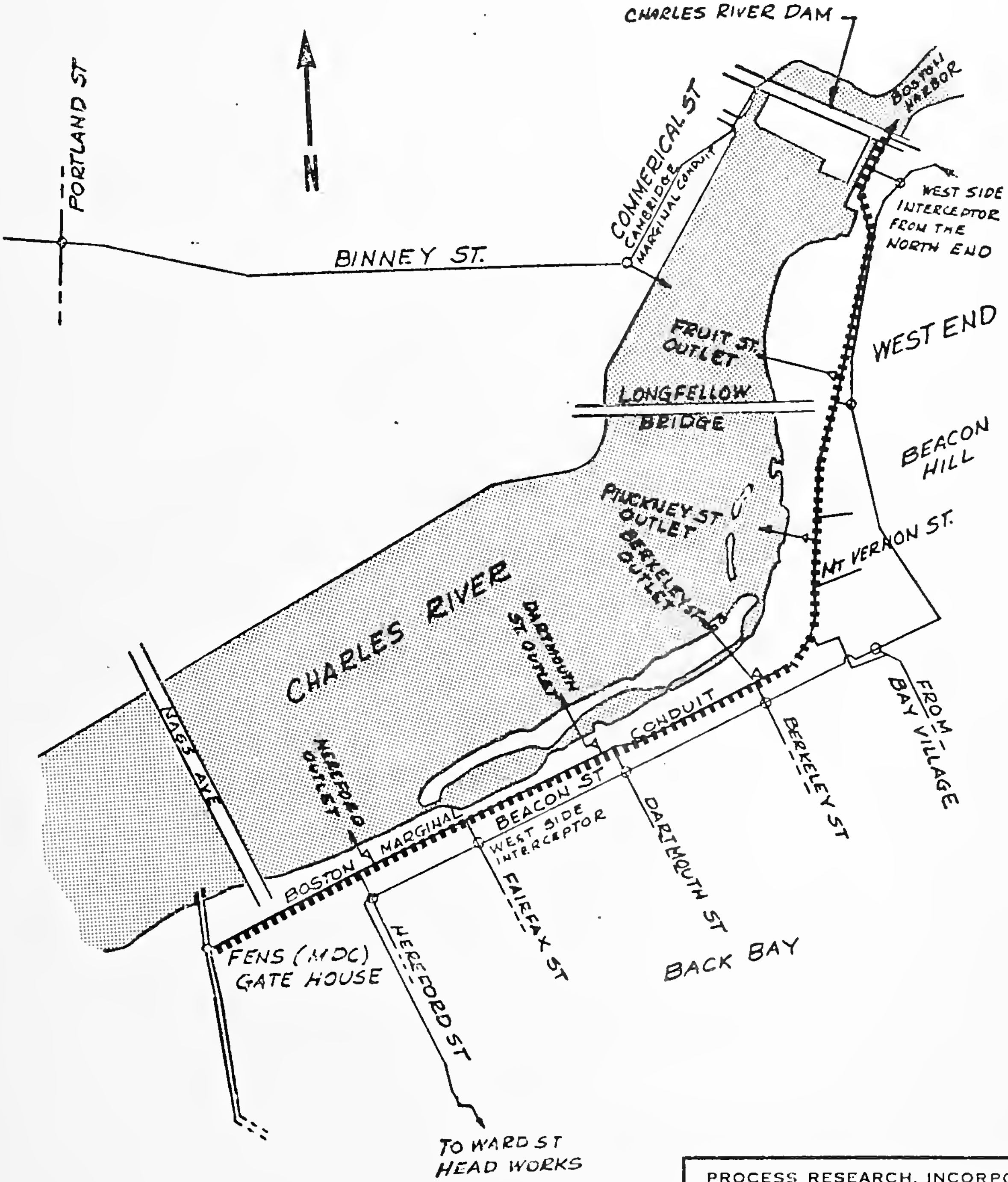
*Environmental Impact Appraisal for the Charles River Marginal Conduit Project, prepared by the Commonwealth of Massachusetts Metropolitan District Commission, September 1974.

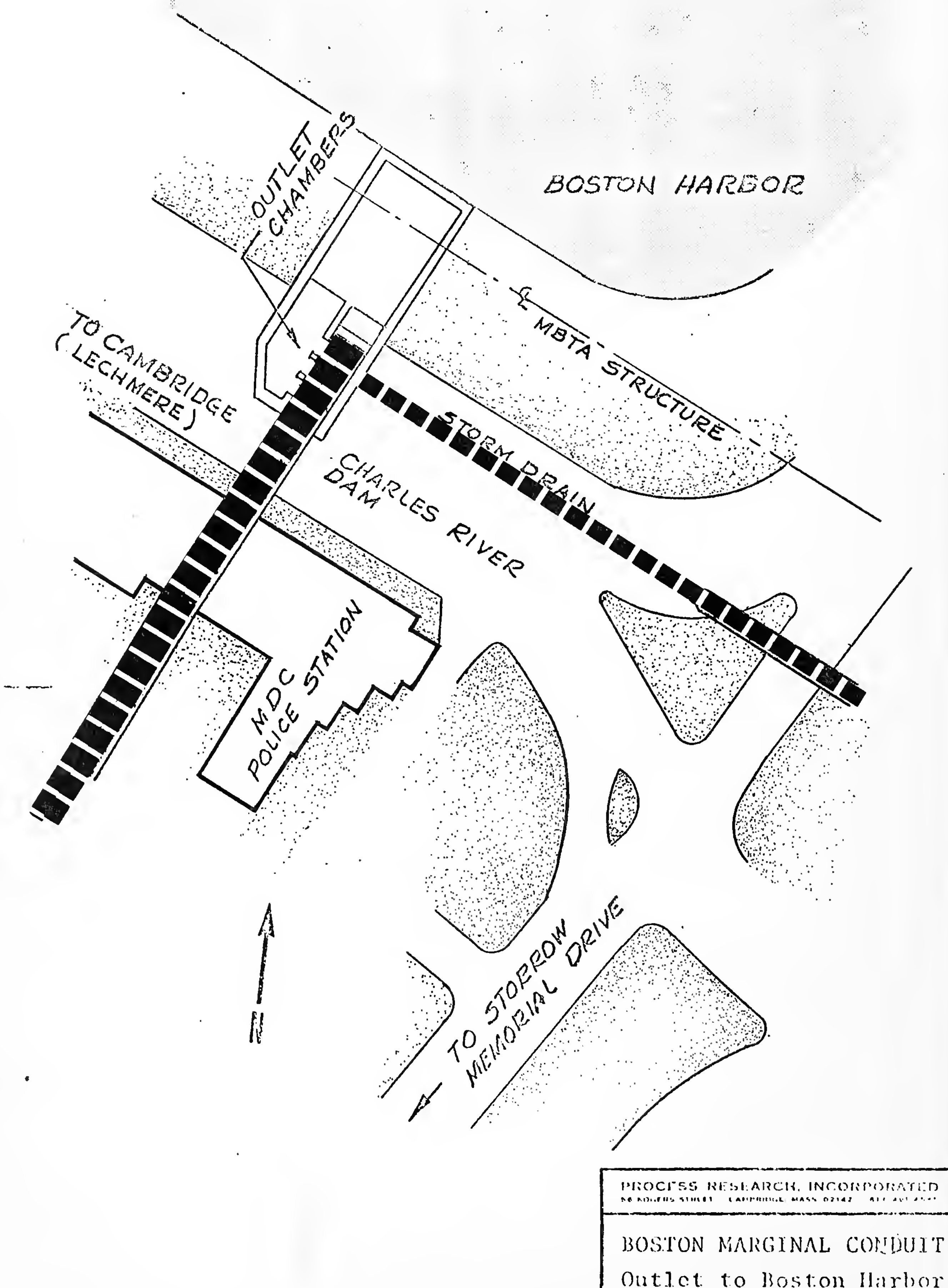
Figure VI-11




PROCESS RESEARCH, INCORPORATED
58 ROGERS STREET CAMBRIDGE, MASS 02142 617 491 4545

BOSTON MARGINAL CONDUIT

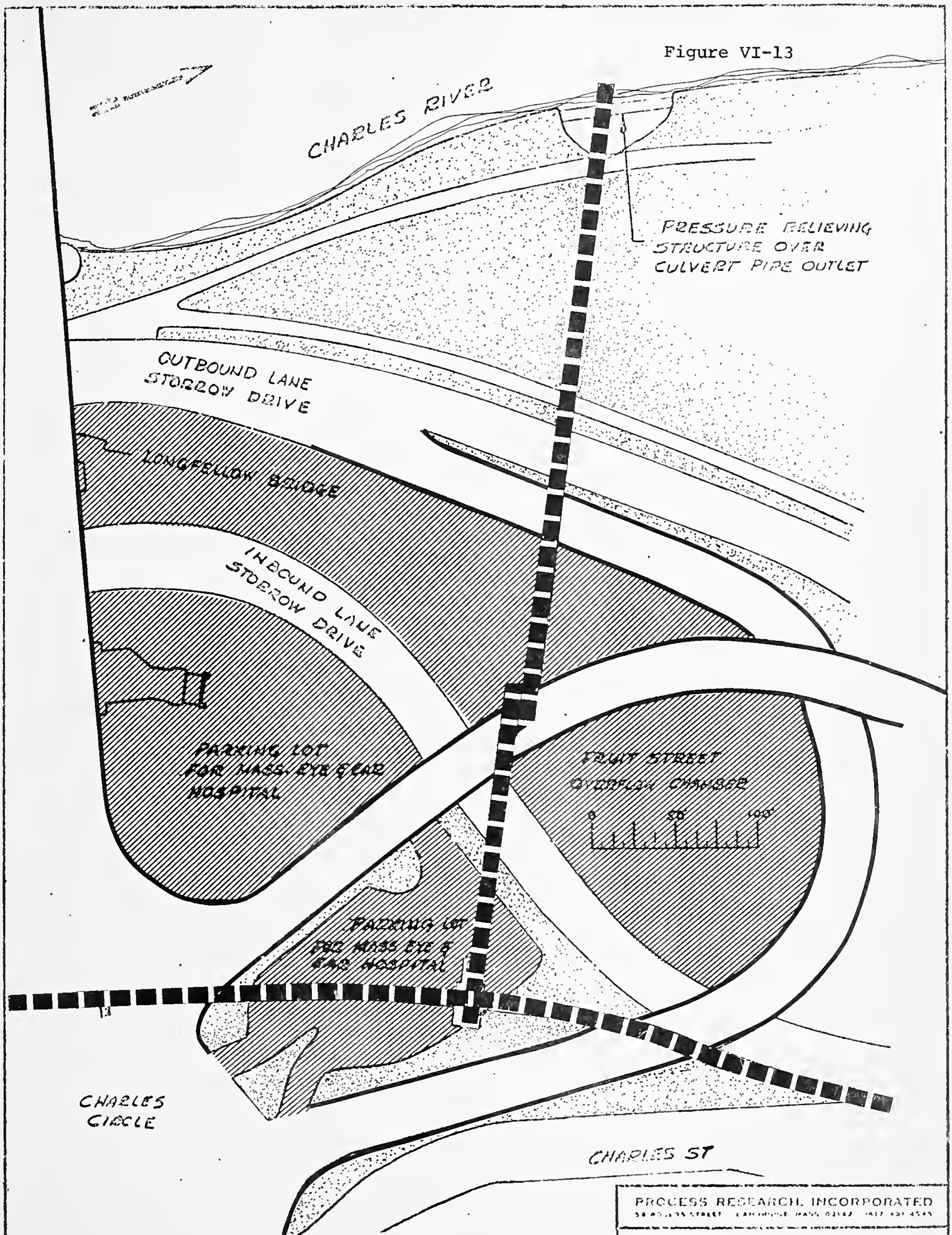
Figure VI-12




PROCESS RESEARCH, INCORPORATED

BOSTON MARGINAL CONDUIT
Outlet to Boston Harbor

Figure VI-13




PROCESS RESEARCH, INCORPORATED

BOSTON MARGINAL CONDUIT
Outlet near Fruit St.

Environmental Effects

See p. D-10, response (9).

During construction of the ACC, runoff that will be collected by storm sewers flowing into the Boston Marginal Conduit will contain an increased load of suspended solids, which may temporarily lead to a slight increase in turbidity at the point of discharge into the Charles River estuary. Because the sand, and clay that is washed out of the construction site, settle quickly, the turbidity will quickly return to its normal level.

It is projected that the ACC will increase the sewage loading by 7,280,143 cubic feet per year, or 0.15 mgd, based on the historical average loadings of the MGH. Most of the sewage from the ACC will be piped to the Deer Island Sewage Treatment Plant via the West Side Interceptor.

Currently, the Deer Island plant provides only primary treatment and is designed to handle up to 925 mgd.* During the dry weather, the average flows are about 300 mgd. The additional load imposed by the ACC would be approximately 0.05 percent of this amount and could be handled under normal conditions. The MDC is studying plans to upgrade the sewage treatment facilities in order to protect Boston Harbor and to comply with state and federal standards.

Not building the ACC would avoid the construction runoff and additional sewage loadings imposed by a new building. Deferred action would assure that no construction runoff would reach the Charles River or Boston Harbor because the Boston Marginal Conduit capacity would be improved and the detention station would be complete in 1978, if MDC plans proceed on schedule. Upgraded sewage treatment facilities at Deer Island would assure that all ACC sewage would receive a higher degree of treatment before discharge to Boston Harbor.

Alternative sites or designs for the ACC will not change the sewage loadings, runoff characteristics, or impacts on the Charles River and Boston Harbor, which have been described for the proposed plan.

Measures to Minimize Harm

See p. D-21, Response (10).

The MDC is submitting plans to the Environmental Protection Agency (EPA) for a treatment facility to handle the sewage overflows carried by the Boston and Cambridge marginal conduits.

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*Mr. Hayes, Metropolitan District Commission, telephone conversation, March 28, 1975.

This facility would improve the water quality in the Charles River Basin and in the Boston Harbor by reducing the frequency, volume, and strength of the sewage overflows. Plans call for extension of the Boston conduit across the river to join the Cambridge conduit, and the construction of a chlorination-detention-pumping station to remove settleable solids and to destroy bacteria. The new design will eliminate salt water intrusion which at present reduces the carrying capacity of the conduit by about one half. This station has a planned capacity to treat all of the combined sewage from these conduits up to 323 mgd, which is the flow that may be expected to be exceeded by a storm once in 5 years. The treated effluent will be discharged below a new dam being constructed by the Army Corps of Engineers. The removed solids will pass through a grinding operation to be sent to the Deer Island Sewage Treatment Plant via the metropolitan sewerage system. This chlorination-detention-pumping station is planned for completion in 1978, before completion of the ACC (1980).

Although some sewage from the ACC will overflow into the Boston Marginal Conduit, only once in 5 years can sewage be expected to overflow into the Charles River. The chlorination-detention-pumping facility will ensure that sewage overflows will have considerably less adverse impact on the quality of Boston Harbor than is experienced presently.

## AIR QUALITY

This section includes an assessment of the air quality impacts of demolition and construction and traffic. The building will be heated by district steam purchased from Boston Edison (see letters in Appendix A) and will not contain any onsite heating system. The existing pathological incinerator will be used as needed and no new incinerators will be constructed.

### Impacts Associated with Demolition and Construction

See p. D-2, Response (11).

Demolition of the Moseley and Walcott buildings for the construction of the ACC are discussed here. Because the two buildings are located in the midst of a busy hospital complex, the Moseley and Walcott buildings would be taken down by hand rather than by ball and crane operations. This minimizes the safety hazards associated with demolition and also reduces the dust problems. In such an operation, workmen using hand tools take apart the buildings, sending the wreckage to the ground via lifts or by dropping it down covered chutes. Air quality impacts associated with hand demolition would be minimal.

Excavation of the site and construction of the ACC will also produce dust, however. Wetting with water or calcium chloride can help prevent dust from becoming windborne. Dirt which might be tracked off the site to become a dust source on nearby roads can be largely elminated by providing wooden tracks for trucks on the site to minimize wheel contact with dirt, by washing the weels of departing trucks, or by utilzing other methods to shake dirt free of truck wheels. State and municipal air quality regulations require wreckers and contractors to apply reasonable dust control measures as they may be necessary. If any unanticipated dirt problems arise in the course of the demolition these, too, will be controlled. The Department of Public Works guidelines on dust control during construction would be consulted and the building contractors would be required by their contract to control dust problems.

### Impacts Associated with Traffic

The air quality impact of the proposed ACC has been analyzed using traffic data provided in the Traffic and Parking Section of this report. For purposes of this analysis, appropriate traffic and air pollution emission factors are utilized for present conditions (1975), the estimated project completion date (1980), and 20 years after ACC completion (2000). The following comparative calculations for these time periods were made:

- Mesoscale analysis of pollutant generation on the streets bordering and within the MGH campus.

  -- Maximum 1-hour generation of carbon monoxide, hydrocarbons, and oxides of nitrogen.

  -- Maximum 8-hour generation of carbon monoxide, hydrocarbons, and oxides of nitrogen.

  -- Average daily generation of carbon monoxide, hydrocarbons, and oxides of nitrogen.

- Analysis of the impact of the ACC on the average daily generation of air pollutants, including levels of carbon monoxide, hydrocarbons, and oxides of nitrogen, on Cambridge Street, Blossom Street, and Parkman Street.

- Carbon monoxide levels at sensitive receptors within the MGH complex. Six specific receptor locations were modeled with respect to 1- and 8-hour carbon monoxide levels:

  -- Entrance to the MEEI on Charles Street

  -- Entrance to the Warren Building on Charles Street

  -- Entrance to MGH on Blossom Street

  -- House Clinics on Blossom Street

  -- Entrance to the White Building on N. Grove Street

  -- Entrance to the proposed ACC on N. Grove Street.

The results of this analysis were compared with 1- and 8-hour standards for carbon monoxide levels.

<u>Analysis of Existing Conditions</u>: Mesoscale analysis were conducted for carbon monoxide, hydrocarbons, and nitrogen oxides - three pollutants directly related to transportation. In order to perform the calculations, assumptions were made about the likely age mix of vehicles and their speed along the routes being examined for the three time periods indicated - 1975, 1980,

and 2000. Traffic growth projections from the current study were used for 1980; more general predictions for the area were used for 2000.

The mesoscale analysis of ambient conditions shows that the amount of the carbon monoxide, hydrocarbons and oxides of nitrogen in the air will decline between 1975 and 1980. (See Table VI-20.) By the year 2000, carbon monoxide production will be approximately 43 percent of present levels. Hydrocarbon production will be reduced to approximately 61 percent of 1975 levels, and oxides of nitrogen will be about 68 percent of 1975 levels.

Table VI-21 shows the ambient levels of sulfur dioxide ($SO_2$) and suspended particulates that are typical of the MGH area. Since the ACC will burn no fuel, it will have no impact on the levels of these pollutants.

See pp. D-2, response (12) and D-3, response (14).

Analysis of ACC Air Quality Impact: Results of a mesoscale analysis applied to information on the contribution of vehicle trips resulting from the construction of the ACC indicate an insignificant impact on total pollutant generation in the MGH complex. Increases in traffic volume due to the ACC would produce 92 additional vehicle miles traveled (VMT) per day, distributed on N. Grove, Charles, and Cambridge streets. This figure represents only 0.76 percent of the total estimated VMT on these streets in 1980. (See Table VI-22.) It is in line with the revised transportation control plan being developed for Metropolitan Boston to ensure that the standards for carbon monoxide and oxidants are met. A preliminary version of this plan was published in the Federal Register, Vol. 40, No. 41, February 28, 1975.

Carbon Monoxide at Sensitive Receptors: Background carbon monoxide levels representative of present conditions were obtained from the Science Park air quality monitoring station, which is the station closest to the MGH campus. Since the wind generally blows across the Charles River to MGH, data collected from this station provides good information on background carbon monoxide levels. Although some air quality standards have been exceeded at Science Park, the most recent projections by the EPA (APRAC model) indicate that air quality at this site will be in compliance with ambient air quality standards by 1977. Hence, at

the time of completion of the ACC (1980) no violations of the federal carbon monoxide standard for 1 hour (worst hour) of 35 parts per million (ppm), nor the 8-hour average of 8 ppm would be expected.

Estimates were then made of ambient carbon monoxide levels at the six sensitive reception locations with the aid of the California Highway Model, i.e., A Mathematical Approach to Estimating Highway Impact on Air Quality. Calculations were made for two specific meteorological conditions: typical, as indicated by Class D stability and moderate winds; and worst case, as indicated by Class F stability and low winds.

The results of this analysis are shown in Tables VI-23, VI-24, and VI-25, following. As is evident from these tables, the vehicle emissions from traffic presently on the streets at these six locations accounts for a very small percentage of the carbon monoxide levels at these sites when backround conditions from Science Park are assumed. As vehicular controls become more stringent and the fleet of vehicles on the roads is newer, on the average, then carbon monoxide levels will improve even more. This is evident from tables, which show fewer parts per million in 1980 and 2000 than in 1975.

Since the projected levels of carbon monoxide are derived from total traffic flow, and since these levels are now low and declining relative to the standard, it can be concluded that the incremental traffic generated by the ACC will not be sufficient to noticeably raise the level of carbon monoxide at the six receptor locations studied.

TABLE VI-20
MESOSCALE ANALYSIS: ESTIMATES OF TRANSPORTATION-GENERATED POLLUTANTS WITHIN THE MGH COMPLEX

| Street | Emission Year | Carbon Monoxide (Pounds) | | | Hydrocarbons (Pounds) | | | Oxides of Nitrogen (Pounds) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Peak Hour | Peak 8-Hour | Daily Average | Peak Hour | Peak 8-Hour | Daily Average | Peak Hour | Peak 8-Hour | Daily Average |
| Cambridge | 1975 | 65 | 444 | 817 | 8 | 57 | 105 | 6 | 44 | 80 |
| | 1980 | 31 | 136 | 395 | 4 | 28 | 52 | 4 | 29 | 55 |
| | 2000 | 28 | 192 | 353 | 5 | 36 | 65 | 4 | 30 | 55 |
| Blossom | 1975 | 18 | 101 | 177 | 3 | 15 | 26 | 3 | 16 | 29 |
| | 1980 | 8 | 48 | 83 | 1 | 7 | 13 | 2 | 12 | 20 |
| | 2000 | 8 | 44 | 77 | 2 | 9 | 16 | 2 | 12 | 20 |
| Charles | 1975 | 23 | 167 | 338 | 3 | 21 | 43 | 2 | 17 | 34 |
| | 1980 | 11 | 79 | 161 | 2 | 11 | 22 | 2 | 11 | 23 |
| | 2000 | 9 | 70 | 142 | 2 | 13 | 27 | 2 | 11 | 23 |
| N. Anderson | 1975 | - | - | 7 | - | - | 1 | - | - | 0.7 |
| | 1980 | - | - | 3 | - | - | 0.4 | - | - | 0.4 |
| | 2000 | - | - | 2 | - | - | 0.4 | - | - | 0.3 |
| N. Grove | 1975 | - | - | 75 | - | - | 10 | - | - | 8 |
| | 1980 | - | - | 33 | - | - | 4 | - | - | 5 |
| | 2000 | - | - | 20 | - | - | 4 | - | - | 4 |
| Fruit | 1975 | - | - | 17 | - | - | 2 | - | - | 2 |
| | 1980 | - | - | 7 | - | - | 1 | - | - | 1 |
| | 2000 | - | - | 5 | - | - | 0.9 | - | - | 0.7 |
| Parkman | 1975 | - | - | 9 | - | - | 1 | - | - | 1 |
| | 1980 | - | - | 4 | - | - | 0.5 | - | - | 0.5 |
| | 2000 | - | - | 2 | - | - | 0.5 | - | - | 0.4 |

TABLE VI-21
BACKGROUND CONDITIONS FOR SULFUR DIOXIDE
AND SUSPENDED PARTICULATES, 1974

| Pollutant | Measurement (PPM) | | Standard (Fed. & Mass.) | | Number of Times Standard Exceeded |
|---|---|---|---|---|---|
| | Annual Avg. | Max. 24 hr. | Annual Avg. | Max. 24 hr. | |
| Sulfur dioxide | 0.008 | 0.048 | 0.03 | 0.14 | 0 |
| Suspended particulates | 60 | 257 | - | 150 | 1 |

Source: Department of Public Health, Boston Air Pollution Control Data, 1974
Measurements made at Science Park air quality monitoring station

TABLE VI-22
IMPACT OF AMBULATORY CARE CENTER ON AIR POLLUTION
GENERATION WITHIN THE MGH COMPLEX

| Air Pollutant | Daily Pollutant Production in lbs. | |
|---|---|---|
| | 1980 | 2000 |
| Carbon Monoxide | | |
| Total Daily Emission on Affected Streets | 589 | 528 |
| Added ACC Emissions | 4.5 | 2.9 |
| Percent Increase | 0.76 | 0.54 |
| Hydrocarbons | | |
| Total Daily Emissions on Affected Streets | 78 | 96 |
| Added ACC Emissions | 0.6 | 0.5 |
| Percent Increase | 0.77 | 0.55 |
| Oxides of Nitrogen | | |
| Total Daily Emissions on Affected Streets | 83 | 82 |
| Added ACC Emissions | 0.6 | 0.5 |
| Percent Increase | 0.76 | 0.55 |

TABLE VI-23
CARBON MONOXIDE LEVELS RESULTING FROM TOTAL
TRAFFIC FLOW ADJACENT TO SENSITIVE RECEPTORS (PPM)

Typical Meteorological Conditions

| Receptor Location | 1975 | | 1980 | | 2000 | |
|---|---|---|---|---|---|---|
| | Max. 1 Hour | Max. 8 Hour | Max. 1 Hour | Max. 8 Hour | Max. 1 Hour | Max. 8 Hour |
| Mass. Eye and Ear - Charles St. | 1.2 | 0.8 | 0.6 | 0.4 | 0.5 | 0.4 |
| Warren Building Charles Street | 1.1 | 0.8 | 0.6 | 0.4 | 0.5 | 0.4 |
| MGH Entrance Blossom Street | 0.9 | 0.7 | 0.4 | 0.3 | 0.4 | 0.3 |
| House Clinics Blossom Street | 1.0 | 0.7 | 0.5 | 0.3 | 0.4 | 0.3 |
| White Building Grove Street | 0.3 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 |
| Ambulatory Center - Grove St. | 0.3 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 |

CARBON MONOXIDE LEVELS RESULTING FROM TOTAL
TRAFFIC FLOW ADJACENT TO SENSITIVE RECEPTORS (PPM)

Worst Case Meteorological Conditions

| Receptor Location | 1975 | | 1980 | | 2000 | |
|---|---|---|---|---|---|---|
| | Max. 1 Hour | Max. 8 Hour | Max. 1 Hour | Max. 8 Hour | Max. 1 Hour | Max. 8 Hour |
| Mass. Eye and Ear - Charles St. | 5.0 | 3.5 | 2.5 | 1.7 | 1.5 | 2.2 |
| Warren Building Charles Street | 5.7 | 3.9 | 2.7 | 1.9 | 2.4 | 1.7 |
| MGH Entrance Blossom Street | 3.6 | 2.7 | 1.7 | 1.3 | 1.5 | 1.2 |
| House Clinics Blossom Street | 4.5 | 3.4 | 2.2 | 1.7 | 2.0 | 1.5 |
| White Building Grove Street | 1.4 | 1.1 | 0.7 | 0.5 | 0.6 | 0.5 |
| Ambulatory Center - Grove St. | 1.3 | 1.0 | 0.6 | 0.5 | 0.6 | 0.5 |

TABLE VI-24
TOTAL CARBON MONOXIDE LEVELS AT THE PROPOSED AMBULTORY CARE CENTER DUE TO GROVE AND CAMBRIDGE STREET TRAFFIC (WIND PARALLEL TO THE AMBULATORY CARE CENTER)

| Year | Meteorological Conditions | Maximum 1-Hour $C_O$ Levels (PPM) |
|---|---|---|
| 1975 | Worst | 3.8 |
| | Typical | 0.8 |
| 1980 | Worst | 1.8 |
| | Typical | 0.4 |
| 2000 | Worst | 1.7 |
| | Typical | 0.4 |

## NOISE

The environment surrounding the proposed Ambulatory Care Center would be affected by noise level changes due to demolition of existing buildings on the site, construction of the ACC, and its subsequent operation. Because the noise levels associated with construction are expected to be most significant, they will be treated in the greatest detail. The impact of each operation with and without feasible noise control measures will be considered. For purposes of comparison, noise levels in dBA and the relative loudness of typical noises in indoor and outdoor environments are shown in Table VI-25.

### Noise Assessment Method

Assessment of the impact of demolition and construction noise on the existing environment requires knowledge of three elements:

- the level of construction noise at its source
- the transmission path, and
- the receiver.

The level of construction noise at its source for different stages of construction will be discussed in detail below. The points at which ambient noise levels have been measured will be considered the receivers of the construction noise. The transmission path from the source to each receiving location will be characterized in terms of distance and the barriers present to noise propagation. Given all of this information, the increase in noise level at each receptor location can be calculated.

### Noise Levels During Demolition and Construction

See pp. D-3, response (15) and D-4, response (16).

The noise levels that will occur during construction of the ACC will vary greatly at different times, depending on the phase of construction and the specific pieces of equipment being used. However, in a study conducted for the EPA,* an analytic model was developed that combined these factors to calculate estimates of the noise levels associated with different types of sites and different phases of the construction process.

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*Report NTID 300.1, Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances, U.S. Environmental Protection Agency, by Bolt, Beranek, & Newman, December 31, 1971.

TABLE VI-25
NOISE LEVEL AND RELATIVE LOUDNESS OF TYPICAL NOISES
IN INDOOR AND OUTDOOR ENVIRONMENTS

| $L_A$ dBA) | Subjective impression | Community* (outdoor) | Home or industry* (indoor) | Relative loudness (human judgment of dilletem sound levels) |
|---|---|---|---|---|
| 130 | | | | 32 times as loud |
| | Uncomfortably | Military jet aircraft takeoff with after-burner from aircraft carrier at 50 ft. (130 dBA) | Oxygen torch(121 dBA) | |
| 120 | | | | 16 times as loud |
| | loud | Turbofan aircraft at takeoff power under flight path at 200 ft. (118 dBA) | Riveting machine (110 dBA). Rock-n-roll band (108-114 dBA) | |
| 110 | | | | 8 times as loud |
| | Very | Same jet flyover at 1,000 ft. (103 dBA). Boeing 707, DC-8 at 6,080 ft. before landing (106 dBA). Bell J-2A helicop-ter at 100 ft. (100 dBA) | | |
| 100 | | | | 4 times as loud |
| | loud | Boeing 737, DC-9 at 6,080 ft. before landing (97 dBA) Motorcycle at 25 ft. (90 dBA) | Newspaper press (97 dBA) | |
| 90 | | | | 2 times as loud |
| | Moderately | Car wash at 20 ft. (89 dBA). Prop. plane flyover at 1,000 ft. (88 dBA). Diesel truck, 40 mph at 50 ft. (84 dBA). Diesel train, 45 mph at 100 ft. (83 dBA). Power mower at 25 ft. (85 dBA) | Food blender (88 dBA) Milling machine (85 dBA) Garbage disposal (80 dBA) | |
| 80 | | | | Reference Loudness |
| | loud | High urban ambient sound (80 dBA). Passenger car, 65 mph at 25 ft. (77 dBA). Freeway at 50 ft. from pavement edge 10 a.m. (76± 6 dBA) | Living room music (76 dBA) TV-audio, vacuum cleaner (70 dBA) | |
| 70 | | | | 1/2 as loud |
| | | | Cash register at 10 ft. (65-70 dBA). Electric typewriter at 10 ft. (64 dBA). Dishwasher, rinse at 110 ft. (60 dBA) | |
| 60 | | | | 1/4 as loud |
| | | Air-conditioning con-densing unit at 15 ft. (55 dBA). Large trans-formers at 100 ft. (50 to 60 dBA) | | |
| 50 | | | | 1/8 as loud |
| | Quiet | Bird calls (44 dBA). Lower-limit urban day-time ambient noise (40 dBA) | | |
| 40 | | | | 1/16 as loud |
| | Just Audible | [Scale interrupted] | | |
| 10 | | | | |
| | Threshold of hearing | | | |
| 0 | | | | |

*Numbers in parentheses are A-weighted levels.

Table VI-26 tabulates the estimated energy average noise level in dBA reported in the EPA study for each of five phases of construction of an office building or hospital. It is assumed that the noisiest piece of construction equipment is 50 feet away from the receiver, and that the construction site has an ambient noise level of 70 dBA typical of urban areas. As the table indicates, the excavation and finishing phases are noisiest with the foundation phase being relatively quiet. The table also shows the estimated duration of each of these phases. Demolition of the existing Moseley, Walcott, and temporary buildings will last for 2 to 3 weeks, and is expected to be done partly by crane with a "clam-shell bucket" attachment, and partly by hand. This method, necessary due to the proximity of existing buildings, is quieter than the typical wrecker crane-and-ball. It is not anticipated that the noise level of 84 dBA, shown for "ground clearing" will be exceeded.

TABLE VI-26
ESTIMATED CONSTRUCTION NOISE AND DURATION OF CONSTRUCTION PHASE

| Phase of Construction | Energy Average in dBA* | Approximate Duration |
|---|---|---|
| Ground Clearing and Demolition | 84 | 2 months |
| Excavation | 89 | 2 months |
| Foundations | 78 | 2 months |
| Erection | 87 | 10-11 months |
| Finishing | 89 | 3-4 months |

*These levels assume that no noise abatement measures have been taken, the type of construction is "hospital," and that all pertinent equipment is present at the site. Derived from Table 1-A of EPA Report NTID 300.1 of the Environmental Protection Agency, Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances, December 31, 1971, by Bolt, Beranek & Newman, Inc., p. 19, and contractors' estimates of phase duration.

Moreover, the noise levels shown in that Table VI-26, would probably be exceeded for only 4 weeks during excavation, when steel sheet piles would be driven along the foundation perimeter. At present, it is anticipated that the foundation will be a reinforced concrete mat bearing on the stiff clay existing at the proposed elevation of the lowest floor of the ACC. Installation of the sheet piling would be necessary for foundation de-watering and lateral earth support. If design-phase engineering studies indicate that the ACC would be subjected to adverse long-term settlements with such a mat foundation, the probable foundation system would be deep piles, bearing in the underlying glacial till or bedrock.

Standard air pile drivers used for this purpose are quite noisy, producing peaks of up to 103 dBA. Use of better exhaust mufflers can reduce these peaks to around 95 dBA, and can also change the character of the noise sufficiently to substantially reduce the annoyance they cause.* Use of diesel-operated pile drivers would produce similar peaks. The use of a sonic or vibratory pile driver is not feasible, because this kind of pile driver does not operate effectively in the stiff clays underlying the ACC site. These and other techniques to minimize the noise of sheet pile driving are discussed later in this section.

Since pile driving represents a special problem, both technically and legally, and will only be of short duration relative to the whole construction process, noise levels generated by this activity will not be used as the "worst case" construction noise level. Instead, the impact analysis will assume that the worst case noise level is 89 dBA. This is the level shown in Table VI-26 for the two noisiest stages of construction: excavation and finishing.

<u>Construction Noise Level Reduction Potential</u>

The EPA report previously cited also assessed how much noise reduction could be achieved using presently available control measures such as better exhaust mufflers or mobile pieces of construction equipment. Information derived from

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* Inter-Noise 1972 Proceedings, <u>Control of Construction Noise</u>, John T. D'Neill, Washington, D.C., October 4-6, 1972.

that report and consultation with equipment manufacturers indicate that the construction noise levels during excavation and finishing (the two noisiest stages) could be reduced to 84 dBA with available equipment quieting measures.* These results were confirmed as reasonable and conservative by consultation with officials at the New York Transit Authority, who have required their contractors to meet noise control standards similar to those now proposed in Boston. It is estimated that similar, or slightly smaller noise level reductions could be achieved for the other phases of construction. The cost and performance penalties of these noise control measures would be small. New York Transit Authority officials estimate that such measures have added considerably less than 1 percent to the cost of construction projects comparable in size to the ACC.

Noise Propagation

When propagated in the open air, sound levels are diminished or "attenuated" as the inverse square of the distance from the source. This rate translates to a 6 dBA attenuation per distance doubled. Buildings blocking the line-of-sight to the construction equipment create a shielding affect which adds significantly to this reduction. Also, as stated in the EPA report, as the propagation path crosses a street intersection there is an additional attenuation of approximately 10 decibels. Interior locations with closed windows will experience approximately 20 decibels additional attenuation.

Construction Noise Level Impact

Based on the previous assumptions about noise levels at the source and noise propagation, the level of construction noise that would be received at each noise level measurement location was calculated, both with and without quieting techniques. The ambient noise level at a point and noise received from a distant source do not combine additively, but in a manner depending on the difference between them. If the noise level received from the distant source differs by more than 10 decibels from the ambient level, only the higher level of the two is perceived unless one of the two sources has unusual tonal

*See appendix for further discussion.

characteristics. If the two noise sources are close together the noise level experienced at the point will be raised somewhat above the higher of the two levels. Table VI-27 shows the present ambient noise levels at each of the measurement locations and the new noise levels expected during construction. The resultant noise levels, both with and without use of quieting techniques, are shown in this table, and displayed by location in Figure VI-14.

If a point is either far away from the construction site, or has a high ambient noise level, the impact of construction noise is relatively small. Conversely, nearby observers at locations with presently low ambient noise levels will experience the greatest adverse impacts. It is at such locations that noise control measures have the greatest effect.

Table VI-27 clearly indicates the influence of these factors. Point 7, the intersection of North Anderson and Parkman streets, and Point 8, in the MGH courtyard, will receive the greatest noise level increases - 14 and 18 decibels, respectively, without noise control. Even with equipment quieting measures, these locations would still experience noise level increases of 10 and 13 dBA, which would "sound" twice as loud to an observer.

Along N. Grove Street adjacent to the construction site (location #5), observers would be closest to the construction activity and would experience the highest noise level. However, the already high ambient noise level at this location means that the net increase will be smaller. Construction noise at this location would be perceived as somewhat less annoying due to this "masking effect" of the already high noise level.

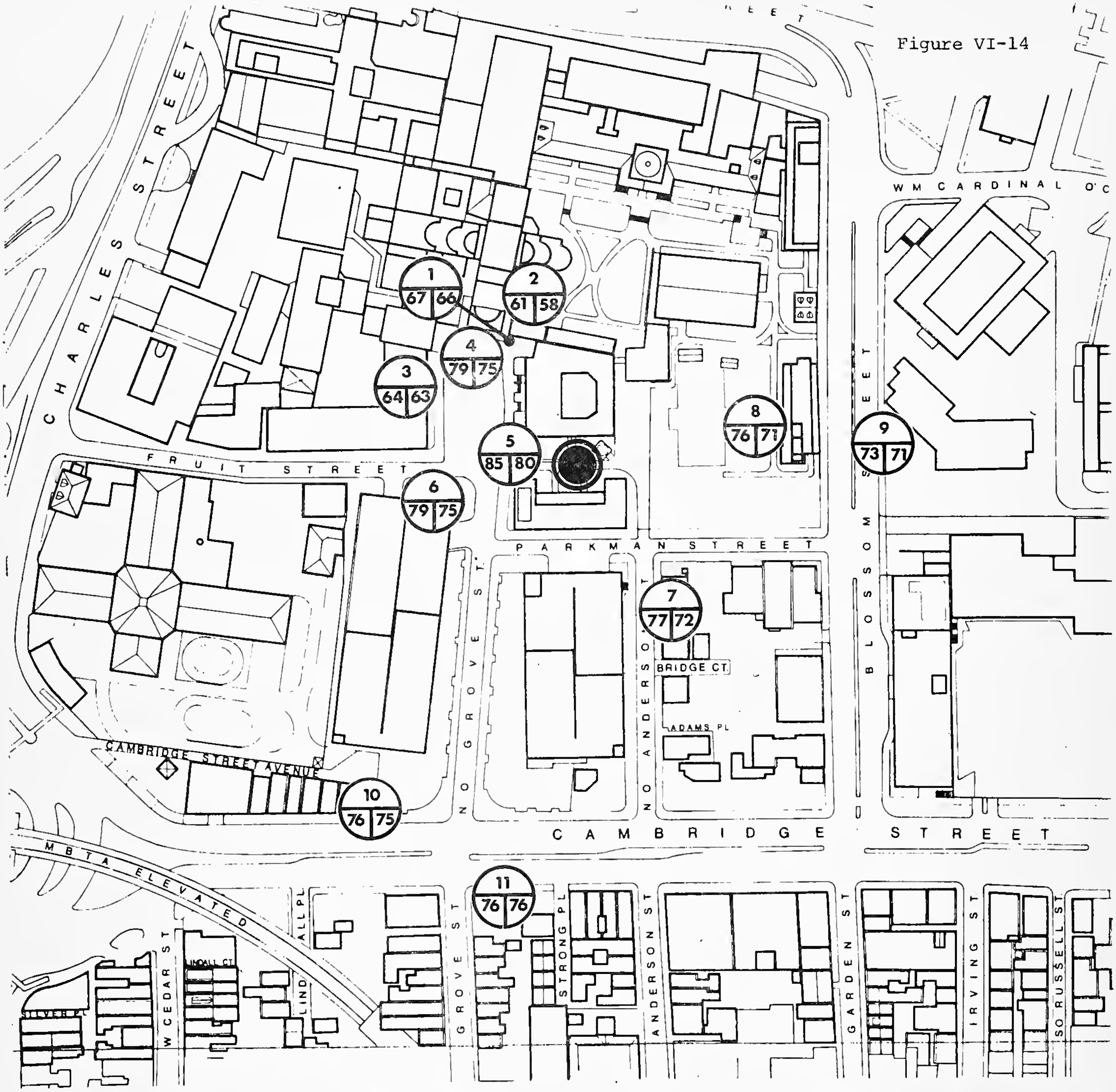
The effect of construction noise will be smaller in other areas. At interior hospital locations, (assuming closed windows), there will be an average increase in ambient noise levels of 1 to 5 decibels. While a change of one decibel is just perceptible under ideal conditions, a change of 3 decibels is perceptible under everyday conditions, and 1 of 5 decibels is clearly noticeable. Use of equipment quieting techniques can reduce noise levels at these locations by up to 3 decibels.

TABLE VI-27
CONSTRUCTION NOISE LEVEL IMPACT

| Point No. | Location | Measured Ambient $L_{eq}$* | $L_{eq}$ Without Noise Control Measures | $L_{eq}$ With Noise Control Measures |
|---|---|---|---|---|
| 1 | White Bldg. - inside main lobby | 66 | 67 | 66 |
| 2 | White Bldg. - 5th floor, patient bedroom | 56 | 61 | 58 |
| 3 | Clinics Bldg. Ambulatory Screening Clinic | 63 | 64 | 63 |
| 4 | Outside White Bldg. Main Entrance | 70 | 79 | 75 |
| 5 | N. Grove St. - south edge of Moseley Building | 70 | 85 | 80 |
| 6 | N. Grove St. - near parking garage entrance | 68 | 79 | 75 |
| 7 | N. Anderson St. - MGH property line | 63 | 77 | 72 |
| 8 | MGH Courtyard - Bartlett Hall | 58 | 76 | 71 |
| 9 | Blossom St., east side - Blackstone School | 69 | 73 | 71 |
| 10 | Cambridge St., north side - Boston Five Cent Savings Bank | 75 | 76 | 75 |
| 11 | Cambridge St., south side - N. Grove Street | 76 | 76 | 76 |

* $L_{eq}$ - Energy Average Noise Level in dBA.

Figure VI-14




# Ambulatory Care Center
## Environmental Impact Report

Prepared for
**Massachusetts General Hospital**
**C.S.C.D.C.**
**Massachusetts D.P.H.**

Prepared by
Resource Planning Associates, Inc.
In association with
Wallace, Floyd, Ellenzweig, Moore, Inc.
Alan M. Voorhees and Associates, Inc.

## CONSTRUCTION NOISE LEVELS
SOUND LEVELS IN dBA

A.C.C. SITE

LOCATION NUMBER
WITH EQUIPMENT QUIETING
WITHOUT EQUIP. QUIETING

0 40 80 160 240 FEET

FEBRUARY 1975

At other outdoor locations, the effect of noise levels due to construction varies with distance from the site. Present ambient noise levels along Cambridge and Blossom Streets are already high enough so that construction noise will cause little or no increase in noise levels, particularly with use of equipment quieting measures. Beyond the area shown on the map in Figure VI-14, the construction noise should not be audible, except faintly during occasional quiet moments.

## Evaluation of Noise Impact

Regulations for the control of construction noise have recently been proposed by the Boston Air Pollution Control Commission, and are now in public hearings and legislative review. These regulations would make it unlawful for the average "noise level rating" emitted from construction sites to exceed 75 dBA as measured at the lot line of the nearest residential structure, or 80 dBA at the lot line of the nearest commercial structure. The "noise level rating" is defined as a measure of the intrusive noise level received due to construction; it is approximately equivalent to the "energy average" ($L_{eq}$) values given for construction in this report. Maximum or peak noise levels received due to construction could not be higher than 85 dBA at a residential structure and 90 dBA at a commercial structure. These noise level limits would not apply to impact equipment, such as piledrivers, provided that such equipment is fitted with mufflers, or other appropriate measures are taken to reduce the noise level.

Figure VI-14 indicates that without noise control measures, a noise level of 77 dBA would result at the lot line of the residential building located on N. Anderson Street near the corner of Parkman Street (location #7). This level would exceed the proposed "noise level rating" standard of 75 dBA by 2 dBA. However, with noise control measures the construction noise level at this point would be reduced to 72 dBA, thus meeting the City of Boston requirement. However, when construction activity is taking place close to this location, both the maximum peak noise level of 85 dBA and the noise level rating of 75 dBA would probably be exceeded for brief periods even with full noise control measures. A variance procedure exists in the present noise control regulations that would also be applicable to the proposed regulations on construction noise. If ACC construction does prove to exceed the stated standards, even with full efforts to control noise, such a variance could be applied for.

Another important criterion for evaluation of the effects of construction noise is its effect on hospital operations. The greatest effect would be some level of speech interference and annoyance. The effect would be greatest when pile driving activities or other peak construction noises are occurring. Without noise control methods, the magnitude of these effects could interfere with speech and be annoying, and could have an impact on the delivery of medical care.

## Noise of Operations

The operation of the ACC could cause increases in ambient noise levels stemming from two sources: noises emitted from the building itself (air supply, exhaust, and cooling systems), and noise of increased motor vehicle traffic generated by users of the building.

The air supply, exhaust, and cooling systems of the ACC can and will be controlled to insure that their noise levels are not above the ambient level.

This can be achieved by careful placement of air intake and exhaust louvers and by the use of acoustical louvers, acoutic duct lining, and other noise control design techniques, if required. Specific guidelines are available from the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) for proper acoustical design of these systems.* Use of these guidelines during design and construction of the ACC will ensure a minimum impact from noise generated by the building itself, both on the surrounding community and within the building proper. Any sound generated by these systems will be essentially inaudible beyond the immediate area of the building, due to the fairly high ambient noise levels in the area, which are fairly high levels even at night.

## Measures to Control Construction Noise

As indicated above, equipment quieting techniques, are presently available and will be used to reduce equipment noise from 89 dBA at the source to 84 dBA. This is probably sufficient to meet the proposed City of Boston noise control standards virtually all of the time.

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*ASHRAE Guide and Data Book Systems, American Society of Heating, Refrigeration, and Air Conditioning Engineers, 1971.

The most common method of quieting movable pieces of earthmoving and materials handling equipment such as trucks, buckhoes, and bulldozers is the use of better exhaust mufflers and intake silencers. Such devices typically provide 5 to 10 dBA noise level reductions. Other methods can be used, such as those listed by the EPA report (cited above). These include the following methods of reducing construction noise other than direct engine quieting.

- "Replacement of individual operations and techniques by less noisy ones - e.g., using welding instead of riveting, mixing concrete offsite instead of onsite, and employing prefabricated structures instead of assembling them onsite.

- Selecting the quietest of alternate items of equipment - e.g., electric instead of diesel-powered equipment, hydraulic tools instead of pneumatic impact tools.

- Scheduling of equipment operations to keep average levels low, to have noisiest operations coincide with times of highest ambient levels, and to keep noise levels relatively uniform in time; also, turning off idling equipment.

- Keeping noisy equipment as far as possible from site boundaries.

- Providing enclosures for stationary items of equipment and barriers around particularly noisy areas on the site or around the entire site."

Such mitigation techniques are outlined in greater detail in a recent report published by the U.S. Dept. of the Army Construction Engineering Research Laboratory.* Procedures suggested in this and other reports can be used as detailed guidelines by the contractor building the ACC.

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*Construction Noise: Specification, Control, Measurement, and Mitigation, U.S. Dept. of the Army, Construction Engineering Research Laboratory, Champaign, Ill., October 1974.

Two other specific measures that can be employed during construction of the ACC include:

- Stipulating that construction not begin at early morning hours, to avoid disturbing sleeping inpatients

- Routing trucks used in construction up Parkman, or other streets, rather than N. Anderson St., to avoid excessive disturbance of residential and commercial establishments on this block.

The one noise problem which remains is the driving of sheet pilings during the excavation stage in order to de-water the site and prepare for the foundation. Although the duration of this activity will be very short (4 weeks), it is likely that the proposed noise regulations will be exceeded during this time period. There are several ways in which this problem could be solved, but these solutions must be weighed against their benefits since they are all quite costly.

New pile drivers are currently in the prototype stage which operate on the principle of compressed air propelling the pile, rather than impact from a hammer. These machines, which have been measured as producing 83-74 dBA at a distance of 50 feet, may be available by the time the ACC is ready for construction. At present their costs and applicability to the ACC site cannot be readily estimated.

The noise associated with sheet pile driving could be eliminated by using alternate excavation support systems, all of which would involve increased costs. Steel soldier piles and wood lagging could be used to support the excavation. Unlike steel sheet piling, the soldier piles could be installed in pre-drilled holes and grouted in place with cement below the excavation, thereby reducing the noise level. It is possible that use of this technique would increase excavation costs by 10 to 15 percent. Preliminary geological investigation suggests that waterbearing sands may be present in the building area. If this is substantiated by detailed design-phase geological studies, use of soldier piles and lagging would be inadvisable because they would create difficult problems of groundwater control and prevention of foundation damage to neighboring structures. Alternately, a reinforced

concrete diaphragm wall constructed by the "slurry trench" technique could be employed.

As previously discussed (see subsurface conditions: geology and hydrology), this method offers a good combination of noise control, excavation de-watering, and lateral earth support. However, its use may involve substantial cost increases, it also imposes constraints on the architectural design of the ACC basement that may not be acceptable. Given these complex interrelationships, the final decision on the lateral excavation support system cannot be made until the detailed design phase.

If the anticipated concrete mat foundation is deemed infeasible during the detailed geohydrological analysis that will accompany building design, then measures to control the noise of deep pile driving would become necessary. To minimize construction noise, the piles might be placed in holes pre-augered through the clays, and then driven to the required penetration resistance. It is estimated that pre-augering would increase the cost of the pile foundations by approximately 10 percent. As previously discussed, these peaks could also be reduced either by use of better exhaust mufflers, or by use of quieter pile driving equipment now in the prototype stage.

<u>Interior Noise Levels</u>

The possible effect of noise levels within the ACC on medical care is a much less critical issue than it would be at a hospital building designed to accommodate inpatients. Nevertheless, techniques that have been developed for design, construction and operation of hospital buildings to insure low interior noise levels are also applicable to the ACC. Such techniques, outlined in a study conducted by the U.S. Public Health Service,* should also be considered during design of the ACC.

<u>Implementation</u>

Two alternative methods are available for implementing measures to control construction noise: 1) use of specific contract provisions stating allowable noise levels or specifying that certain noise control methods be used (a model for such

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*<u>Noise in Hospitals</u>, U.S. Dept. of Health, Education, and Welfare, Public Health Service, 1963.

contract provisions is available from the New York Transit Authority); 2) informal agreement with a contractor that noise levels will be kept to a minimum.

See p. D-4, response (17).

The decision as to which of these two methods will be used will ultimately depend on the judgment of the ACC developers, the MGH and the CSCDC, all of which will be responsible for reaching agreement on which method is most feasible. However, both MGH and CSCDC have committed themselves to using appropriate noise control measures to minimize impact on the community and on hospital operations. The method of implementation chosen will necessarily involve agreement with the ACC contractor about the cost of construction noise control measures.

The acoustical considerations that are relevant to operation of the ACC will be considered by the project architect and incorporated into the building design.

## SOLID WASTE

The Ambulatory Care Center will have a small impact on solid waste both during demolition and during operation.

### Construction

Solid waste from demolition and construction activities will be the responsibility of the contractor who will arrange to haul away all debris. Bricks from the Moseley and Walcott buildings will probably be sold and reused. During construction, the wastes will consist largely of cardboard and paper packaging materials totaling about 2,500 cubic yards. Most of this waste will be generated when interior finishing is underway during the last 4 to 5 months of construction. The cardboard may be recycled by the hospital's cardboard recycling center, or disposed of in a private landfill by the contractor.

### Current Waste Loads

A complete study of the hospital's solid waste was conducted in October, 1970, at which time, 7.4 tons per day was recorded as the average waste generation. Today, the MGH generates approximately 12 tons of solid waste each day. Growth in the number of patients and staff and greater use of disposables account for this 9 percent average annual increase in wastes over the past 4 years. This growth rate for solid waste is about twice the historical growth rate of outpatient visits of 4.2 percent per year. That is, about 4 percent of the growth in solid waste generation is due to increased patient visits, and about 5 percent is due to the use of more disposables. With no new construction at the hospital, solid waste generation is expected to continue to grow at the historical rate of 9 percent per year, and reach 21 tons per day by 1980.

An analysis of the type of waste generated in 1970 yielded results tabulated as follows:

TABLE VI-28
COMPONENTS OF MGH SOLID WASTE - 1970

| Type of Waste | Percent of Total |
|---|---|
| paper | 48.3 |
| plastic | 10.8 |
| boxes | 12.2 |
| animal wastes | 6.0 |
| kitchen wastes | 6.6 |
| needles | 0.4 |
| wood | 0.1 |
| rags | 0.2 |
| leaves | 0.2 |
| glass | 12.9 |
| cans | 2.3 |

## Solid Waste Disposal

Hospital wastes are separated at the source into plastic bags for contaminated and noncontaminated wastes. Contaminated wastes, such as infectious materials and laboratory specimens, are labeled with distinctive tags and incinerated, principally at the MEEI incinerator. Specialized contaminated wastes such as human tissues from the operating rooms or post mortems, animal tissues from research labs, and bandages and other septic materials from the intensive care unit are burned in small incinerators located in the Warren basement, Research Building 6, and White 12, respectively. The high temperatures of the incinerators kill all infectious agents and leave a clean ash residue.

Radiologic wastes are brought to the waste disposal facility where they are stored in a locked and labeled area in barrels approved by the Atomic Energy Commission. Up to 30 barrels may be stored at one time. Twice a month they are picked up for disposal. Usually about 20 of these barrels are full at the time of pickup, although as many as 24 may be full. The major source of radiologic wastes is the nuclear medicine division.

Noncontaminated hospital wastes are contained in plastic bags and carted to the waste disposal facility which occupies 2,500 square feet in Temporary Building 2 behind the Moseley Building. The carts used for hauling wastes are light-weight plastic and easily cleaned. At the disposal facility, the plastic bags of trash are dumped into one of two compactors which move the refuse into two 42-cubic-yard dumpsters. The daily trash pickup, ozone cleaning of the dumpsters, and pest extermination keep rodent, bacteria, and insect populations to a minimum. Each day, one to three dumpster loads are picked up by the City of Boston contractor (which has been Sanitas Waste Disposal of Massachusetts, Inc. for the past 22 years), and hauled to the city incinerator at South Bay. When the city incinerator is shut down or overloaded, the refuse is brought to the city landfill site in West Roxbury. There is no dumping charge at the city facilities and the cost to MGH for pickup is $43 per load. This price is increased if private disposal facilities must be used.

## Recycling of Wastes

The hospital currently recycles cardboard and scrap metal wastes. Cardboard is collected at the same time as the plastic-bagged wastes. At the waste disposal facility, cardboard is manually separated from the bagged wastes and fed into a compactor for

storage in a 50-cubic-yard dumpster. Recycling cardboard reduces the volume of MGH's wastes by approximately 10 percent. Scrap metal from old equipment, remodeling, etc., is also recycled. The amount varies from 5 to 12 tons per month and is stored in a separate area outside the waste disposal facility.

## Impacts of the ACC on Solid Waste

Since the activities of the Ambulatory Care Center will be more like those in the Clinics Building than in the rest of the hospital, estimates of solid waste generated by the ACC are based on current information about wastes from the Clinics Building. Preliminary results of a survey, conducted during January 1975, show that the Clinics Building produces 1.2 tons of solid waste per week. Assuming that the solid waste generated in the Clinics Building is comparable to that for all outpatient activities, it is possible to calculate the solid waste gneeration for ambulatory activities, with and without the ACC.

The traffic survey conducted for this environmental study indicated that there are an average of 900 outpatient visits to the Clinics Building per day. The survey figures translate this average visitation rate to about 4,950 visits per week, allowing for evening and Saturday operations. Thus, each patient visit to the Clinics Building generates about 0.48 pounds of solid waste. This figure is the same as the one derived by a University of Virginia study on estimating wastes produced by treatment of patients in the emergency room or by radiation therapy treatment. It is, however, a higher figure than the figure that was estimated for waste generation by outpatients.*

If the ACC is not built, outpatient visits, including clinics and private physicians, are expected to grow to 2,354 per day, or 12,947 per week, in 1980, implying a solid waste load of 3.1 tons per week by that date. With an annual 5 percent increase in solid waste due to greater use of disposables, this figure is more likely to be 4.0 tons by 1980.

If the ACC is constructed, outpatient visits are expected to grow to 2,650 per day, or 14,575 per week, in 1980. Accounting again for the greater use of disposables, the solid wastes from the new ACC would be 4.4 tons. Comparing the solid waste

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*U.S. Environmental Proection Agency, "Hospital Wastes" (SW-129), U.S. Government Printing Office, Washington, D.C., 1974.

generation in 1980 with and without the ACC, it appears that the use of the ACC would account for an additional 0.4 tons of solid waste per week, or 20.8 tons per year.

Evaluation of Solid Waste Effects

The City of Boston disposes of 375,000 tons of solid waste per year. Of this amount, the City incinerator at South Bay handles 133,500 tons per year. The portion received from MGH currently represents approximately 1 percent of the City's solid waste and up to 3 percent of the incinerator total. Outpatient activities at the MGH now account for 0.1 percent of the incinerator load. A rough conversion factor for estimating the particulate emissions from the Boston incinerator supplied by the Massachusetts Department of Public Health, Division of Environmental Health, is 16 pounds of particulates per ton of refuse incinerated. Applying this factor to the present MGH solid waste load indicates that it may emit up to 32 tons of particulates per year, of which 1.2 tons are attributable to outpatient wastes. By 1980, particulate emissions associated with incineration of outpatient wastes would be 1.7 tons without the ACC and 1.8 tons with the ACC. However, because some of this solid waste is brought directly to the landfill, these emission figures represent the maximum adverse impact on air quality.

The City of Boston incinerator violates city and state air quality regulations and will no longer be in operation in 1980. In addition, the West Roxbury landfill site will be full by that time.

The EPA has ordered the closing of the Boston incinerator on July 31, 1975 and the City of Boston plans to appeal this order through the courts. At present, the City has no plans for future solid waste handling. The Sanitation Department is advertising for bids to remove trash from the city. Bids may also be sought for a new incinerator perhaps similar to the one in Saugus which will provide steam power to be privately owned and managed, although funding for this project has not been approved. The actual impacts of the ACC solid wastes will depend upon the trash handling plan ultimately adopted by the City.

Relocation of the Waste Disposal Facility

Construction of the ACC would necessitate relocation of the waste disposal facility now behind the Moseley Building and a new site has not been chosen. It is probable that wastes handling will remain in the Bulfinch Building courtyard during the construction phase of the ACC, although it will have to be moved away somewhat from the construction site.

Measures to Minimize Harm

See p. D-11, response (19).

Three alternatives are being considered for trash handling in the future. First, the waste handling facility could be moved to another location on the MGH main campus and the present system of collection and haulage retained. The final location of this waste handling facility should be coordinated with the receiving functions of the hospital. Currently, the Jackson Tower basement is a receiving area, but it could be converted to waste handling if the receiving function were to be moved, for example to the ACC. Another location being considered is along Blossom Street next to Bartlett Hall. Easy street access and good connections with the hospital are necessary criteria. A covered walkway or underground tunnel will be required to protect trash handlers from adverse weather as they haul refuse to the new trash handling facility.

A second possibility is to construct a new incinerator. MGH is now in the process of dismantling the incinerator in the basement of the Grey Building which was constructed in 1966. For 3 or 4 years, the hospital incinerated all of its wastes in this facility. Air pollution regulations required adding afterburners and scrubbers on this incinerator. Frequent breakdowns resulting in trash accumulation and costly maintenance and repair led MGH officials to shut down the incinerator and contract with the City of Boston for disposal. Cost will determine if a new incinerator will be built at some future time. For example, if the price of hauling trash is considerably increased by the city, then the incinerator option would be more attractive. If a new incinerator were to be built, it would, of course, comply with all city and state air pollution regulations.

A third alternative now under consideration for trash handling is to develop a comprehensive recycling program to recycle paper, I.V. bottles, and computer printouts and cards, as well as a continuing recycling program for cardboard and scrap metal. Approximately 30 percent of the hospital's trash could be recycled. Also under investigation by the hospital is the feasibility of drying and sterilizing kitchen wastes for use as hog feed. Recycling would benefit the MGH because it would reduce the money spent on waste disposal by selling recyclables and by saving the costs of city haulage. Recycling would also benefit the environment by reducing the volume of refuse which must be incinerated or buried by the city. A firm commitment to recycling combined with a program to minimize wastes is clearly the most environmentally protective approach the hospital could take.

## AESTHETIC IMPACTS

### Evaluation Criteria

Since the ACC is not yet designed, the analysis of aesthetic impacts is confined to volumetric and building-size effects rather than questions related to its specific texture, materials, or form. The evaluation criteria used to assess aesthetic impacts are intended to reveal perceptual differences in the environment resulting from the build and no build alternatives. These criteria include:

- Scale: the relative sizes and proportions of building masses and open spaces to each other and to human beings. Clarity of relationships is desirable.

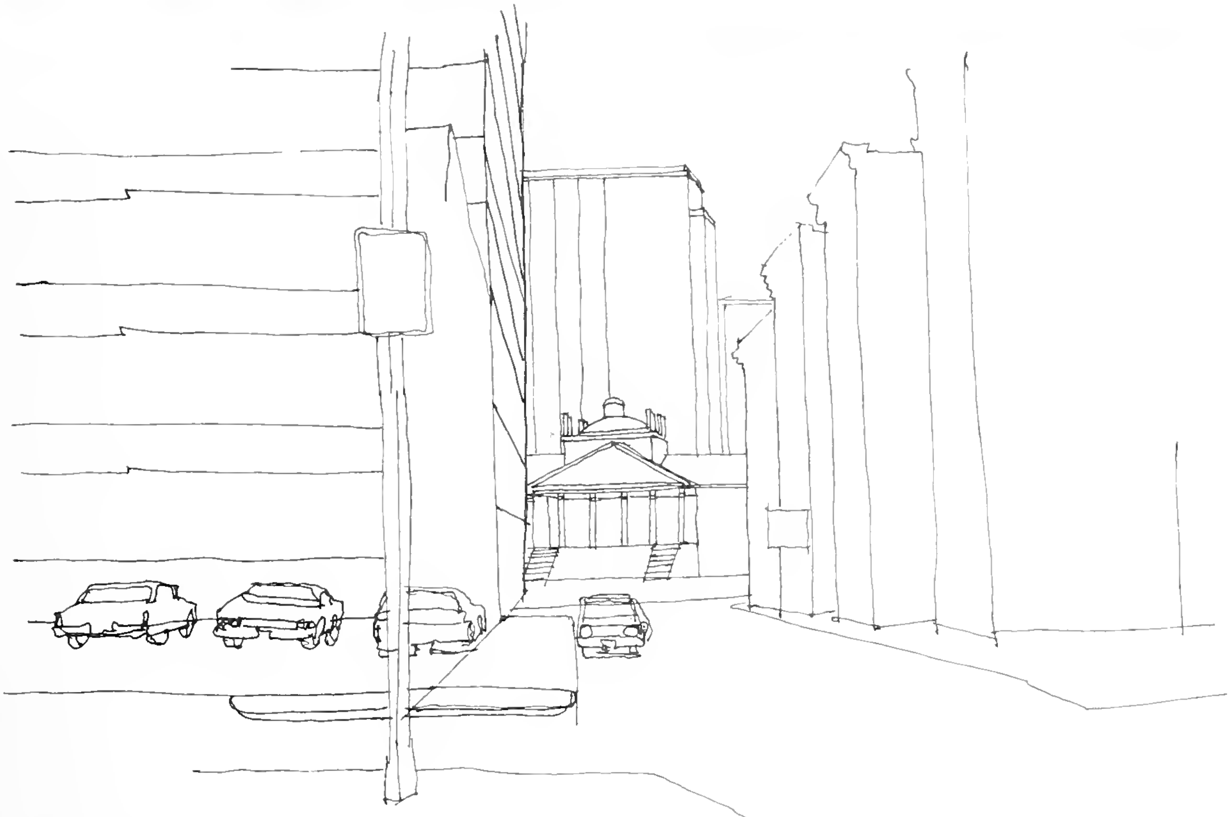
- Massing: whether the visual emphasis of buildings in a complex is matched by their functional importance for users. A match is desirable.

- Shadow: changes in shadow patterns at pedestrian levels. Shading open spaces or pedestrian areas by permanent shadow is undesirable, especially in winter.

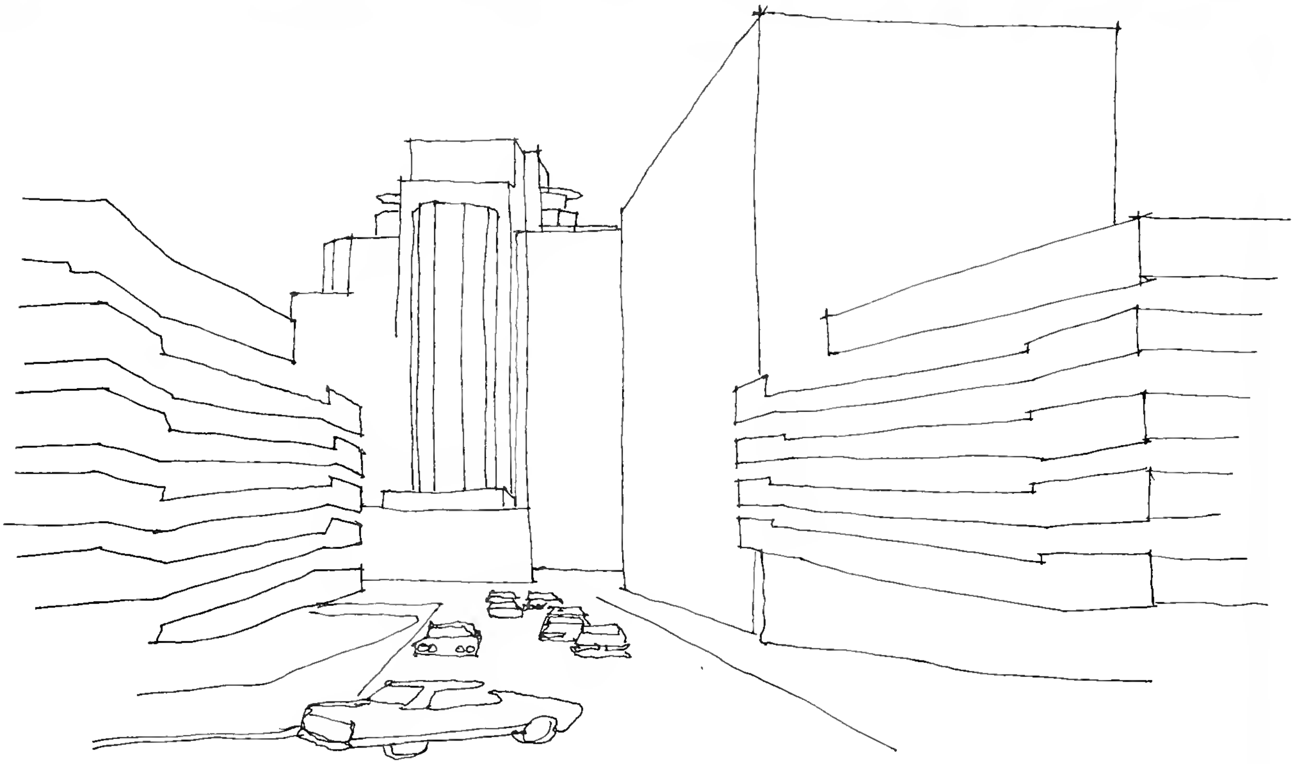
Scale and massing (and to a lesser extent shadow) together influence the "image" of a building complex. A clear image is one in which the visual prominence and functional importance of buildings is well matched and in which both buildings and open spaces seem adequately sized and comfortably spaced. The perceptual effects of a building complex with a distinct image transmit a sense of order, and perhpas even repose, which is judged desirable by/for users. View and shadow effects reflect the consideration given to the interests of neighbors and pedestrians in building design.

### Scale and Massing: the MGH "Image"

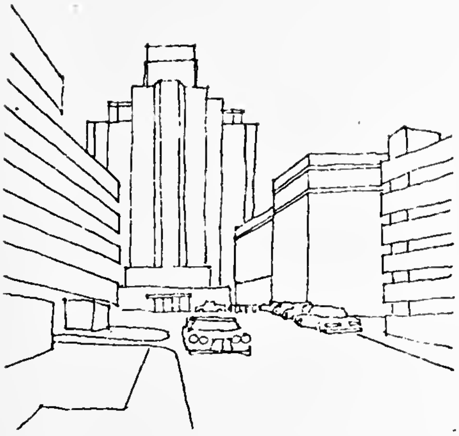
Concerns with scale affects of the ACC arise for the White Building courtyard, the Bulfinch courtyard and Cambridge Street. Massing is more specifically a concern related to the clarity and symbolic presence of entrances to MGH, in particular, the White Building courtyard. Although scale and massing are interactive aspects of architectural aesthetics, they are dealt with separately in the following discussion for the sake of clarity.

EFFECT OF ACC ON BULLFINCH COURTYARD



# EFFECT OF ACC ON MGH ENTRANCE



Scale: Today, MGH is a mixture of tall, massive, modern buildings and older, lower, smaller buildings whose configuration, especially near the proposed ACC site, tends to mask the high-density, modern, urban character of MGH so evident from its interior. The ACC would be located at the boundary between the White and Bulfinch courtyards, areas with contrasting histories and functions. The White courtyard is an urban space, the entrance to a major health facility while the Bulfinch courtyard is a historic open space intended for rest and passive recreational uses.

At the White Building courtyard, the older and newer buildings have a relationship akin to that of foothills and mountains, and the effect of gradually increasing height and bulk is reinforced by the stepped profile of the White Building. Removal of the Moseley and Walcott buildings, among the older and lower structures, and introduction of the 12-story ACC envelope would destroy the gradual introduction of large-scale elements. The emerging character of MGH as a large, densely developed but compact urban institution would be made more immediately and abruptly apparent to the pedestrian.

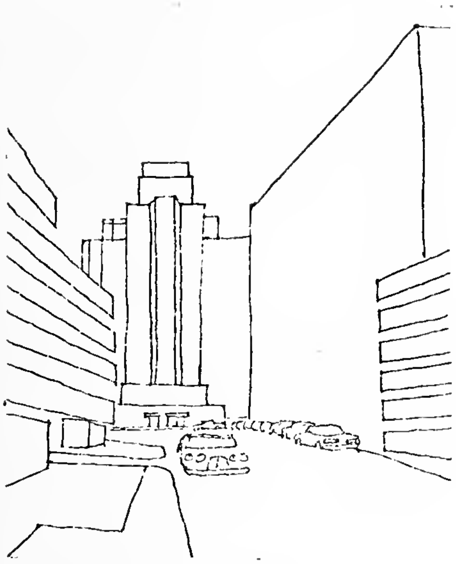
Construction of the ACC would also increase somewhat the visual mass of relatively tall (10 stories-plus) structures visible to a pedestrain on Cambridge Street. However, this effect will be mitigated by orientation of the ACC's long axis and by the building's distance from Cambridge Street.

At present, the Bulfinch Building courtyard is a relatively cramped space with chaotic scale relationships. The foreground is truncated and its limits are unclear; it is cluttered with two temporary structures and construction equipment. The 12-story-plus masses of White, Gray, and the Special Services buildings begin to form a backdrop for the Bulfinch Building, but this effect is broken by the lower masses of the Moseley Building and the temporary structures.

Construction of the ACC would be accompanied by removal of the Moseley and Walcott buildings and temporary structures in the Bulfinch Building courtyard. This would recreate the large open space of the courtyard as a generously dimensioned foreground for the Bulfinch Building itself. The

height and length of the ACC would be sufficient to extend the 12-story masses to the north and west of the Bulfinch Building into a wall setting off the historic area. Construction of the ACC would perceptually simplify the presently chaotic area into one consisting of courtyard, building, and backdrop.

Massing: There is presently a close match between the visual importance and functional significance of the White Building as the "main" entrance to MGH. The visual effect is created by lower buildings flanking the dominant mass of the White Building which terminates the commanding visual axis along North Grove Street. The entrance marquee is the major horizontal element at this end of the street. Final emphasis is provided by the 6-foot rise in ground elevation from Cambridge Street to the White Building entrance.



If the ACC is constructed as shown in the Certificate of Need application, the Moseley and Walcott buildings (which define the low east flank of the White Building courtyard) will be replaced by the 12-story ACC facade. This would simultaneously dimish the visual prominence of the White entrance and create a more slot-like, alley-scaled space. Whatever the season, the ACC facade and the White Building entrance and marquee will be in shadow most of the morning, further deemphasizing the importance of the White Building entrance. Thus, if the existing entrance is maintained, its visual prominence will have to be reestablished if the MGH entrance image is to retain its symbolic strength. If a new main MGH entrance is created, a match between visual impact and function will be necessary.

In summary, without measures to minimize harm, the ACC volume would have negative impacts in the White Building courtyard and positive impacts in the Bulfinch Building courtyard. A number of such remedial measures are dealt with at the end of this section, and in the Chapter VII discussion of performance criteria.

View

The effect of a new development on the views of nearby structures is not, strictly speaking, an environmental issue. However, concern about this issue has been expressed by the community. The existing views of the Charles River, the Boston skyline, Boston Harbor, the Boston Basin, and beyond are now somewhat obstructed by existing buildings. The extent to which these panoramas are impacted by the build and no build alternatives of the ACC is discussed below by affected area.

Beacon Hill: At present, the long axis of the ACC and the view north from Beacon Hill are parallel to each other so that the narrow end of the ACC would be visible to Beacon Hill residents as they look northward. However, as the ACC is narrower and shorter than the MGH Special Services Building behind it, it would thus not block any distant views which are now visible.

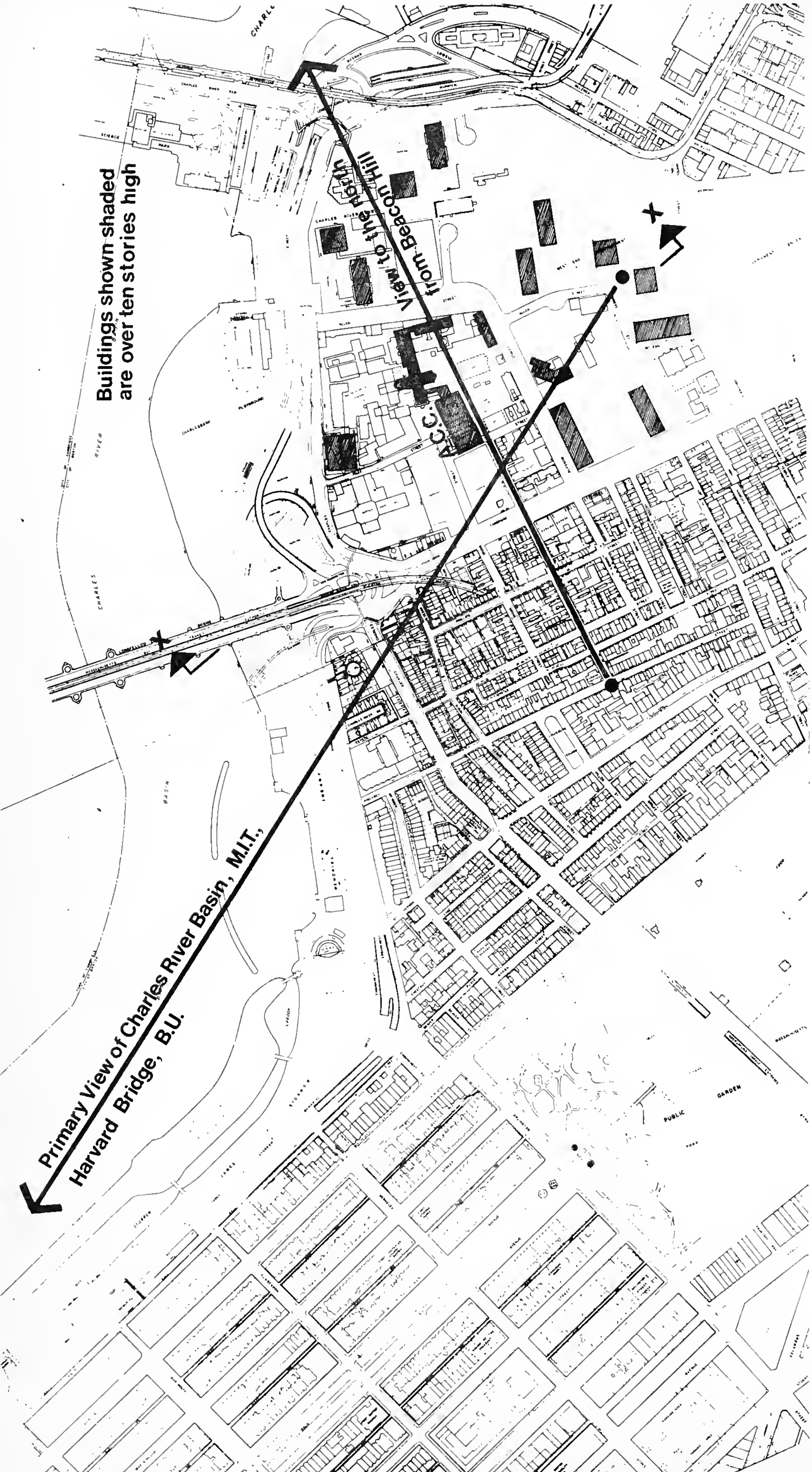
The location of the ACC in the Certificate of Need application does not cut off the view of the Bulfinch Building and Dome along North Anderson Street. In fact, removal of Temporary Building 2, made possible by ACC construction, will slightly increase the width of Bulfinch facade visible from North Anderson Street.

See p. D-8, response 3.

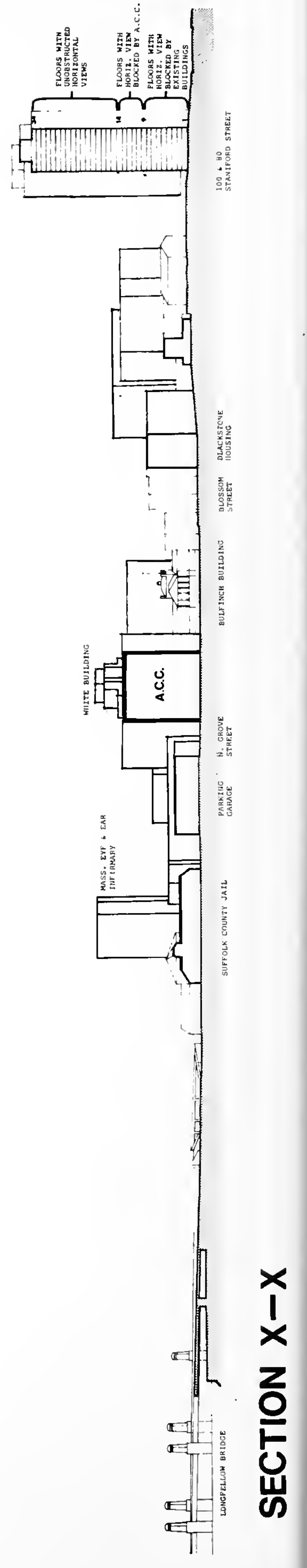
Charles River Park: The ACC will be an addition to the 10-story and larger buildings which give the north side of Cambridge Street its urban skyline, and would be consistant with the scale of buildings in the MGH complex. Construction of the ACC would impact views from two apartment towers presently under construction. These towers, located at 80 and 100 Staniford Street are each 364 feet high. The arc of view towards the southwest from these towers is the area potentially affected by the proposed ACC. Representatives of Charles River Park management consider the southwestern views of the Charles River Basin and Esplanade to be major views with western views of the Cambridge shoreline being less important.

The ACC would not block the major upriver views from the Staniford Street towers. It would only block their secondary views of the Cambridge shoreline for a few stories over existing conditions and even for these stories represent $15^{\circ}$ or less of the $180^{\circ}$+ arc of view. In short, the ACC would have a small impact on views from Charles River Park. (See Figure VI-16.)

Blackstone Housing for the Elderly: Construction of this 116-foot high building is expected to start in late 1975. Residents of the building would have two primary views: upstream (southwest) towards the Charles River Basin and south towards Beacon Hill, Back Bay, and the Boston Basin hills in the distance. The ACC does not affect views of the Basin or the distant hills. The view of the Cambridge shoreline and the hills in the distance will be blocked by MEEI's new building. In summary, the ACC would have a minor impact on views from the Blackstone Housing for the Elderly.



Buildings shown shaded are over ten stories high
View to the north from Beacon Hill
A.C.C.
Primary View of Charles River Basin, M.I.T., Harvard Bridge, B.U.
X

FLOORS WITH UNOBSTRUCTED HORIZONTAL VIEWS
FLOORS WITH HORIZ. VIEW BLOCKED BY A.C.C.
FLOORS WITH HORIZ. VIEW BLOCKED BY EXISTING BUILDINGS
100 & 80 STANIFORD STREET
BLACKSTONE HOUSING
BLOSSOM STREET
BULFINCH BUILDING
WHITE BUILDING
A.C.C.
N. GROVE STREET
PARKING GARAGE
MASS. EYE & EAR INFIRMARY
SUFFOLK COUNTY JAIL
LONGFELLOW BRIDGE
SECTION X–X

## Shadows

Shadow effects of the ACC alternatives (build/ no build) are analyzed for the summer and winter solstices at 10 AM and 2 PM. The times of year chosen, June 22 and December 22 respectively, represent sun angles responsible for maximum and minimum shadows in the course of a year; the times of day chosen encompass typical working day conditions. To simplify comparison, the impacts of both alternatives are illustrated and discussed together.

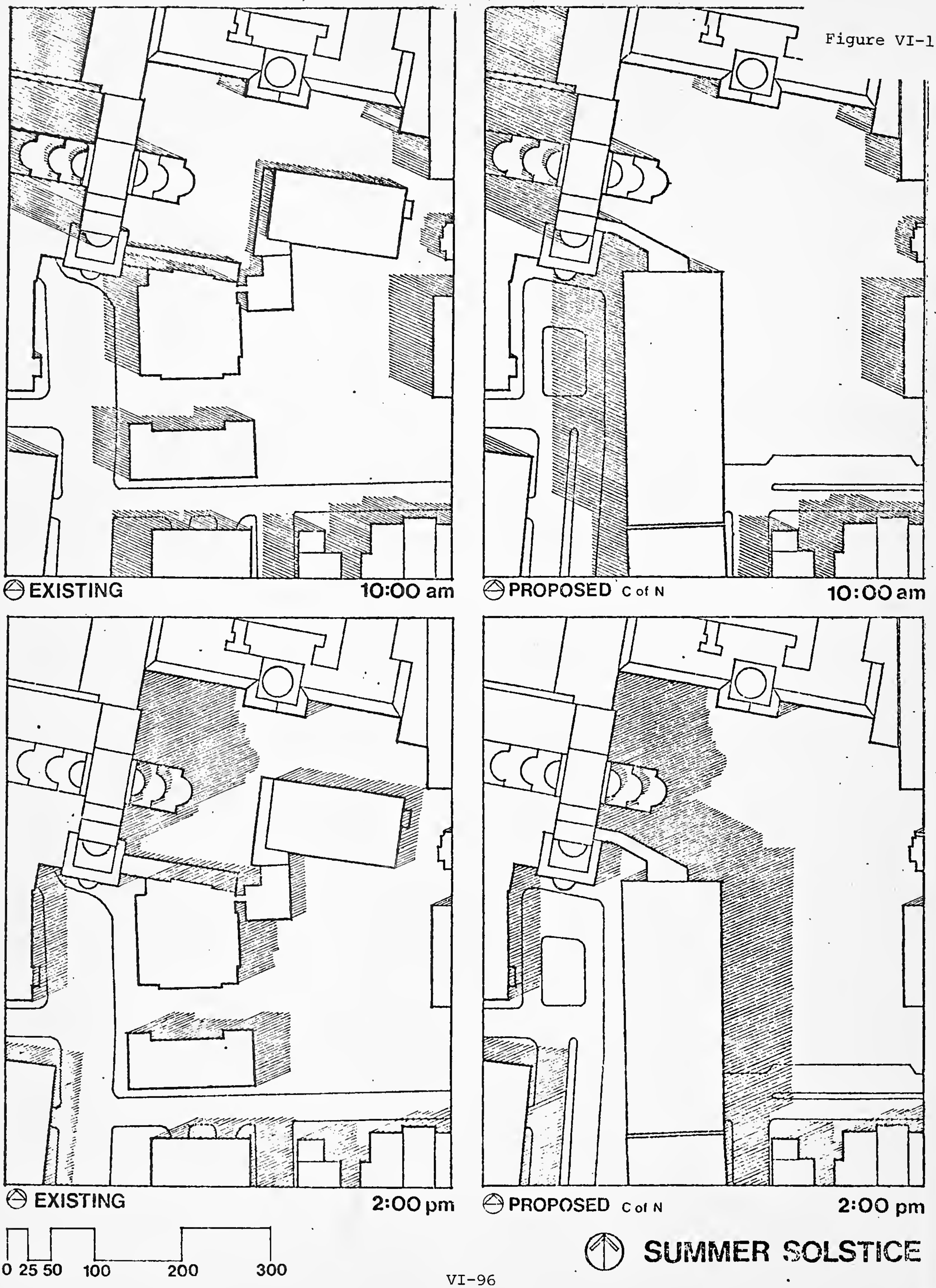
Summer Solstice: Under existing conditions, 10 AM summer shadows cover little area in the courtyards of either the White or Bulfinch buildings (see Figure VI-17). By contrast, the ACC would shade the east side of the White Building courtyard for its entire length - a welcome feature on hot summer days. Removal of the temporary structures in the Bulfinch Building courtyard would reduce the area that is cast into building shadow, but provide the opportunity to plant shade trees.

Under existing conditions, 2 PM summer shadows do not affect large areas of either courtyards of the White or Bulfinch buildings. The ACC would have no affect on the White Building courtyard, but would shade the western edge of the Bulfinch Building courtyard along its length.

Winter Solstice: Existing 10 AM winter shadows cover a substantial portion of the White Building courtyard and a little over half of the Bulfinch Building courtyard. With construction of the ACC, 10 AM winter shadows would cover nearly all of the White Building courtyard, including the Emergency Ward entrance, and somewhat less than half of the Bulfinch Building courtyard. The ACC build alternative does open up a broad band of sunlight in the Bulfinch Building courtyard, a positive impact due to removal of the temporary buildings. (See Figure VI-18.)

At present, 2 PM winter shadows cover most of the courtyards of the White and Bulfinch buildings, and roughly half the Bulfinch Building including a portion of the dome. With construction of the ACC, 2 PM winter shadows would be unchanged in the White Building courtyard. However, somewhat more of the Bulfinch Building courtyard would be shaded, and all of the Bulfinch Building and dome would be in shadow.

Figure VI-17



EXISTING
10:00 am
PROPOSED C of N
10:00 am
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2:00 pm
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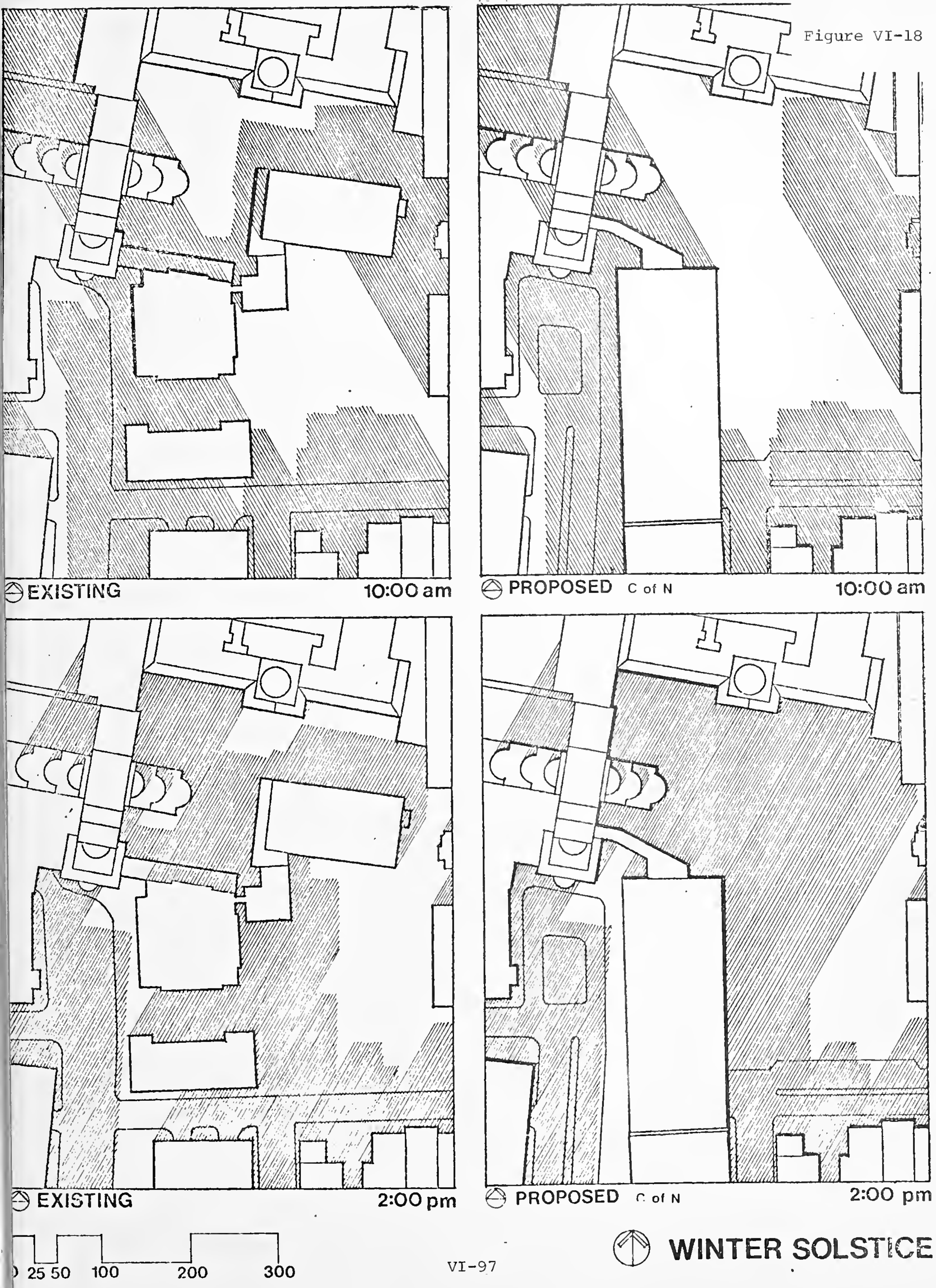
2:00 pm
0 25 50 100 200 300
SUMMER SOLSTICE

Figure VI-18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WINTER SOLSTICE

Shadow effects are not significantly different between the build and no build alternatives. In summer, the ACC would tend to consolidate shadows in the Bulfinch Building courtyard and shade the White Building courtyard more than under existing conditions. In winter, the ACC offers a slight improvement in the Bulfinch Building courtyard in the morning and a slight degradation on sunny afternoons.

In summary, the shadow impacts are comparable between the build and no build alternatives. If anything, the ACC build alternative would be preferable because it consolidates the visual contribution of shadows to massing and scale effects.

Measures to Minimize Harm

A number of approaches may be taken to reduce or eliminate the negative image, view, and shadow impacts of constructing the ACC, as described in the Certificate of Need application, while retaining the ACC benefits. Basically, such efforts fall into three major categories:

- Site the building differently - that is, change the orientation of its long axis
- Change the building envelope and/or profile - e.g., to a tower, a low spread-out building, or a stepped roofline
- Change the MGH main entrance.

As can readily be appreciated, these decisions involve trade-offs. Changing the ACC location on the site presents a dilemma. Reduction of shadow effects in the White Building courtyard and reduction of view impacts on Charles River Park increases shadow effects in the Bulfinch Building courtyard, and affects views from Beacon Hill of the Bulfinch Building. Similarly, changing the building envelope to reduce perceived bulk, affects both internal functional efficiency and the symbolic character of entrance(s). These decisions have further repercussions on other categories of environmental impacts as well. The interdependencies and trade-offs involved in a more comprehensive decision are addressed in the sections of Chapter VII, which considers performance criteria.

## TELEVISION AND RADIO RECEPTION

Any steel structure will produce some adverse affects on television reception. The proposed ACC is surrounded by tall buildings which impact on the adjoining areas already.

At this time, the degree of "ghosting" which may be experienced cannot be accurately predicted, but the potentially affected areas can be identified. All television stations in the Boston area broadcast their signals from Needham, Mass., near the intersection of Routes 9 and 128. A straight line drawn to the proposed ACC from the Needham broadcasting site shows that Bartlett Hall, the Physicians Residence House, the Research Building, Shriners Burns Institute, and the Blackstone School may experience interference in television reception. The height of the buildings in Charles River Park will insure that the quality of television reception for CRP residents will not be affected.

The paging system at the MGH causes some interference with tape recorders and radios in the local area. In addition, the MEEI and Boston Edison use paging systems which also cause interference. The MGH system is licensed by the Federal Communications Commission (FCC), and conforms to all applicable FCC regulations. The ACC will have no affect on the paging system or on any interference caused by it.

## HISTORICAL IMPACTS

There are a number of historic places of national and/or local significance in and around the MGH campus. Those potentially affected by the two ACC alternatives (build/no build) being considered include the Bulfinch Building, the Beacon Hill Historic District, and the Suffolk County Jail.

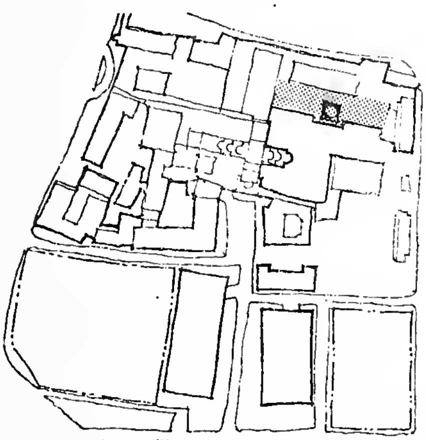
### Evaluation Criteria

The following criteria, derived from Section 106 of the National Historic Preservation Act of 1966, will be used in determining impacts on historic resources:

- The physical alteration of the historic resource
- Nonconformity of the new project with the historic resource and its surroundings
- Disruption of access to the historic resource
- Disruption of the ambient environment of the resource
- Disruption caused by new access to the resource
- Disruption of view of the building (see foregoing discussion of aesthetic impacts).

The basic question is one of how the historic resource, or its environment, would be changed by the project, and whether the proposed changes would enhance or detract from the integrity and original character of the resource.

### Importance of the Bulfinch Building



The Bulfinch Building is named after its designer, Charles Bulfinch, Boston's renowned early nineteenth century architect. It was completed in 1811 as MGH's first building, and is presently included on the National Register of Historic Places. Among its outstanding features are a fine classical portico, cantilevered interior stone stairways, and a skylit dome (probably derived from a similar structure at Philadelphia's Water Works). In the application to the National Register of Historic Places, the following 1824 description of the Bulfinch Building was quoted:

> "This edifice is 168 feet in length, and 54 in its greatest breadth, having a portico of eight Ionic columns in front (on the south elevation). It is built of white Chelmsford granite, wrought with uncommon labour, the columns and their capitals being of the same material. In the centre of the two principal stories are the rooms appropriated to the superintendent, the apothecary, and other officers of the institution. Above these is the operating theatre, lighted from the dome, and fitted up with semicircular seats for spectators. Beneath is the kitchen with its various appendages, the bathing room, wash room, laundry, etc. The stair-cases and floorings of the entries are of stone. The whole house is supplied with heat by air-flues from furnaces in the cellar, and with water by pipes and a forcing pump. Various modern improvements in domestic economy, conducive to cleanliness and comfort are introduced, together with such auxiliary apparatus for the sick as is found useful in the management of their diseases. The wings of the buildings, in the different stories, are divided into wards and sick rooms, which are fitted up in the neatest and best manner. The number of beds contained in them for patients is at present about a hundred...."

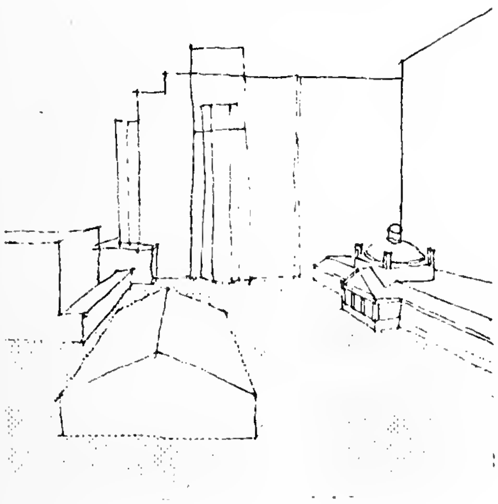
During 1844 to 1846, the two original wings, each five bays long, were doubled in size by the addition of five-bay long extensions, constructed on the main axis, to their east and west ends. Built of granite and in the same Classical Revival style as the Bulfinch Hospital, the added wings made no significant change in the original design of the south (main) facade. The interior of the original hospital, however, was also modernized during that same 2-year period, and almost nothing original (prior to 1846) remains excepting the two stair halls with their fine cantilevered stone stairways.

In addition, MGH holds a significant place in medical history because several important medical advances were first conceived or demonstrated on its campus. Among these, are the identification of appendicitis by Reginal Fitz and the first public demonstration of the use of ether as a surgical anesthetic. The hospital's prominence has been partly due to its importance as a major

force in reducing the pain formerly associated with surgical procedures, and in recognizing the attendant need for extreme speed of operations. Of equal importance has been the introduction, at MGH, of antiseptic surgery by Joseph Lister. But the introduction of ether anesthetic in the U.S., which was memorialized in Eakins' famous painting, took place in the dramatic architectural space beneath the Bulfinch dome. In fact, for this the dome came to be known as the "Ether Dome," and was placed on the National Register of Historic Places in 1965 - long before the rest of the Bulfinch Building was to receive similar protection by placement on the register in 1973.

Existing Conditions

The terraced, formally landscaped courtyard south of the Bulfinch Building was designed to set off the portico and permit a full view of the facade from a distance. At present, two temporary structures (used for research and waste handling, respectively) prevent this intended view, and generate considerable distracting noise (exceeding 75 dBA).



Construction of the proposed ACC would lead directly to removal of the temporary buildings in the Bulfinch Building courtyard; this is not necessarily the case under the no build alternative. Demolition of the temporary structures presents an opportunity to recreate and enhance the formal approach to the Bulfinch Building through carefully planned landscaping.

Impacts of the ACC on the Bulfinch Building

By its length and height, the ACC would extend the length of the 12-story-plus facade which lies behind and next to the Bulfinch Building. Under the no-build alternative, the retention of the Moseley and Walcott buildings prevents lengthening the facade and, therefore, forecloses converting it to form a backdrop to set off and display the historic structure. Thus, siting the ACC as proposed in the Certificate of Need application presents an opportunity to enhance the environment of the Bulfinch Building which is not otherwise available.

Given these considerations, application of the criteria to the ACC leads to the following conclusions.

- Physical Alteration: Neither the Ether Dome nor other areas of the Bulfinch Building are directly affected.

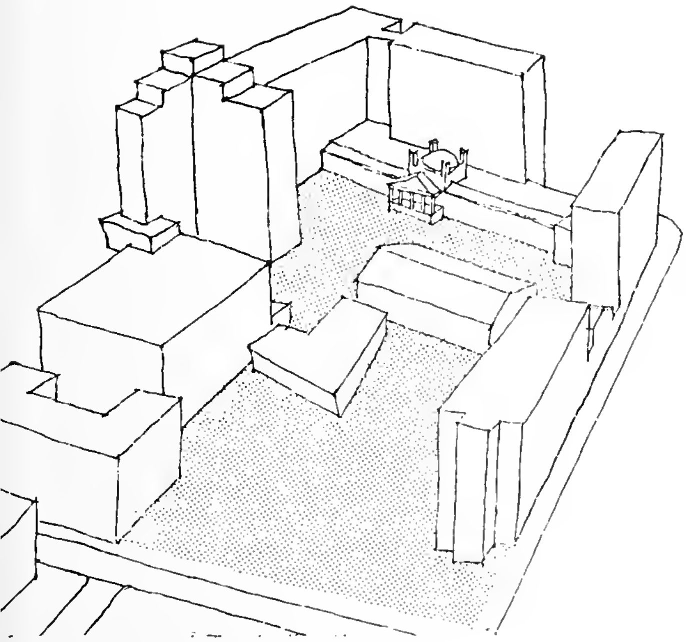
- <u>Nonconformity</u>: The new building will conform to the surrounding hospital uses.

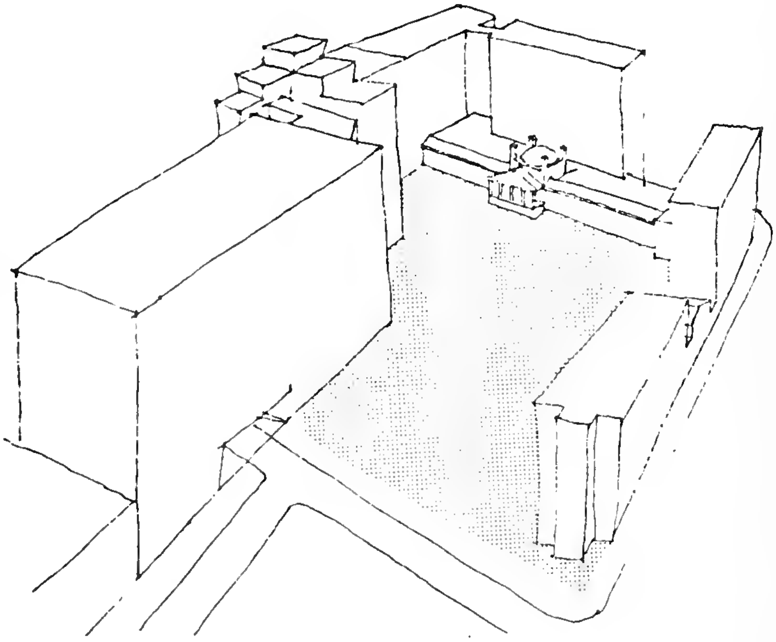
- <u>Disruption of Access</u>: There will be no disruption of access during demolition, construction, or operation of the ACC.

- <u>Disruption of the Ambient Environment</u>: The long-term effect on the ambient environment of building the ACC will be positive. In spite of the larger bulk of the ACC building, the increased open space directly in front of the Bulfinch Building will provide a more appropriate setting for the building facade.

- <u>Disruption Caused by New Access</u>: Pedestrian and visual access would be improved.

In summary, construction of the proposed ACC presents greater opportunities than a no build alternative for enhancing the character of the Bulfinch Building by improving its surroundings.





## PEDESTRIAN LEVEL WIND EFFECTS

In recent years, pedestrian level wind effects in the vicinity of tall new buildings have received considerable attention in the Boston area. The Prudential Tower, John Hancock Tower, the Green Building at the Massachusetts Institute of Technology campus, and the New England Merchants National Bank Building are among the prominent instances of wind tunnel and on-site studies performed to investigate pedestrian and building level winds. Sufficient data have now been accumulated so that some generalizations can be made about the types of building configurations that might cause uncomfortable wind velocities and why. However, any specific configurations will differ sufficiently from the prototype, so that these generalizations can only be stated very tentatively. This is also true for the proposed ACC, because the varied building masses and roof elevations surrounding the proposed site represent a complex aerodynamic situation which has not specifically been studied before.

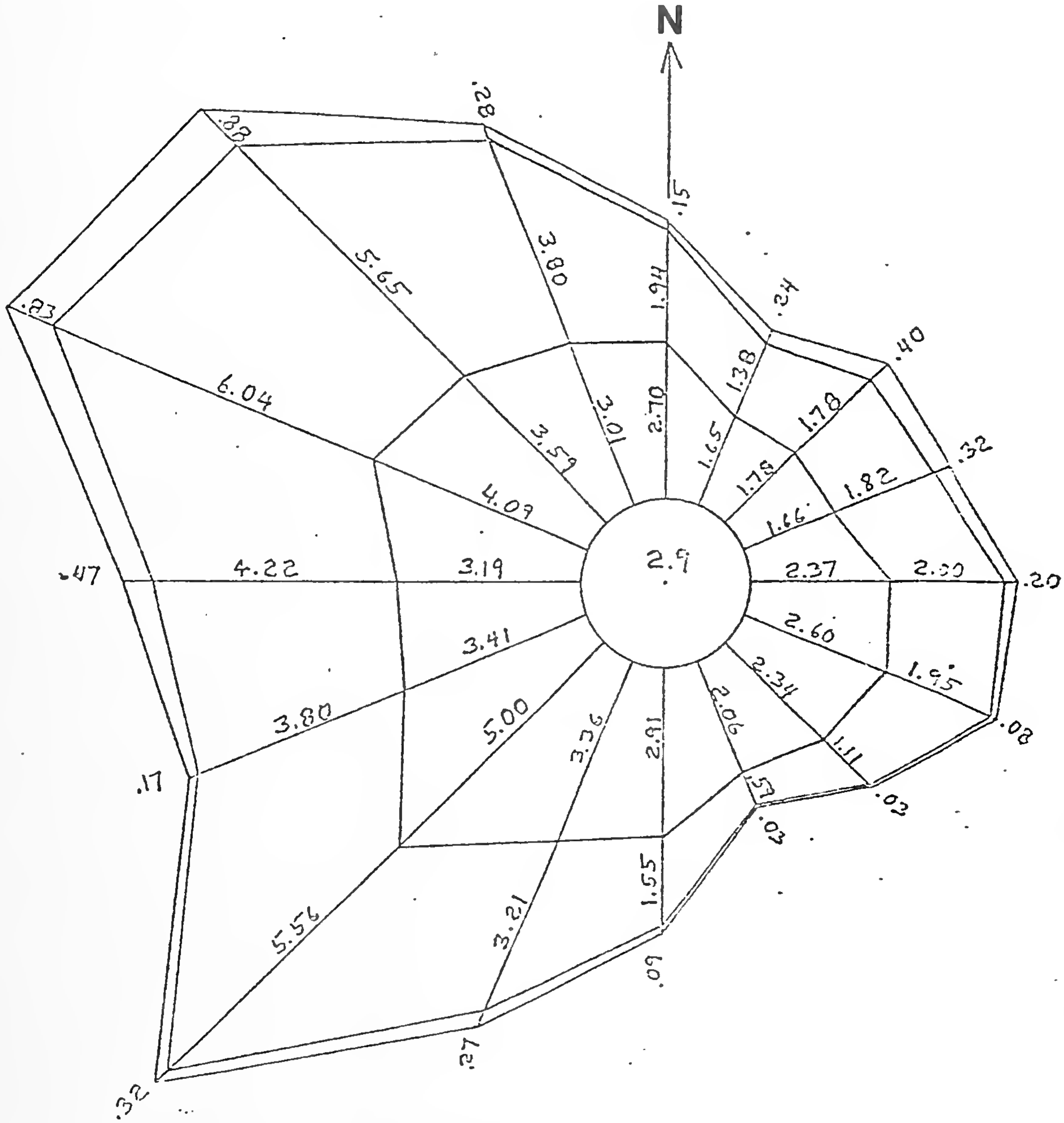
### Surface Wind Conditions at MGH

The wind rose for Logan Airport, Boston, is illustrated in Figure VI-19. As the airport is the nearest recording station, and is located less than 2 miles from the MGH, the wind rose is a very good approximation of conditions at MGH. This wind rose is based on 15 years of hourly weather data from 1950 through 1964. This measurement uses the standard 16 compass points. The length of the line at each compass point is proportional to the amount of time the wind blew from that direction, and the sum of all the compass point lines equals 100 percent. The exterior rose is for winds of 25 mph or greater; the inner roses are for winds less than 25, 12 and 3 mph respectively.

This wind rose measurement indicates that the winds come from the northwest (NW), west-northwest(WNW), west (W), and southwest(SW) most of the time. The NW and WNW winds prevail in the winter from November to April, and the SW winds prevail in the summer from June to September. In general, the SW winds are less bothersome than the WNW and NW winds because they are not as strong and they are normally warmer. Although most New Englanders will tell you that the major local storms are Northeasters (occasional Southeasters occur too), during storms the period of intense precipitation and winds usually only occurs for a day. The prevailing western winds which follow storms maintain high velocities for period ranging from generally 2 to 5 days. People complain

# YEARLY SURFACE WIND ROSE
## For Logan Airport, Boston

Notes:
1. Based on hourly records data from 1950 through 1964.
2. Figures are percent frequency.
3. Categories: Center, 0-3 mph. Radiating out, 4-12, 13-25, over 25 mph.

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more about these cold, westerly winter winds than those blowing from other directions because the discomfort they occasion is longer and more acute.

Wind Effects

While wind speed is generally considered responsible for the severity of wind effects, it is really aerodynamic pressure which causes difficulties. Wind pressure varies directly with the square of its velocity. That is, a 2X increase in wind speed results in $(2)^2$=4X increase in aerodynamic pressure, and similarly, a 3X increase in wind speed results in a $(3)^2$=9X increase in pressure.

In aerodynamic terms, air is a slightly compressible fluid which moves from areas of high pressure to areas of low pressure; this movement is what is experienced as wind. Building configurations affect the free flow of wind, creating areas where the free stream velocity (speed of unobstructed wind) is increased or decreased. That is, wind effects can be amplified (as when speed and hence, pressure are increased) or attenuated (as when speed and pressure are reduced) by building configurations.

Effects of the Proposed ACC

The Ambulatory Care Center described in the Certificate of Need application is located as shown in Figure VI-20. It is shown as a 12-story, 168-foot-high rectangular box extending, via a link, from the White Building to the Parkman Street garage. There is a ground-level opening through the building for the realigned Parkman Street. Until the building is designed, and wind tunnel tests are completed, there is no way to predict the wind effects accurately. However, the configuration proposed does fit two types of situations which have been studied before, and from which one can suggest potential effects. These case situations are described in the following discussion.

Case 1: Low Building Upwind of a High Building with an Open Space Between

The first situation is that of a low building upwind of a high building with an open space between them (compare (1) and (2) in Figure VI-21). Several experimental observers (see Wise*) report that, given these conditions (e.g., the proposed ACC

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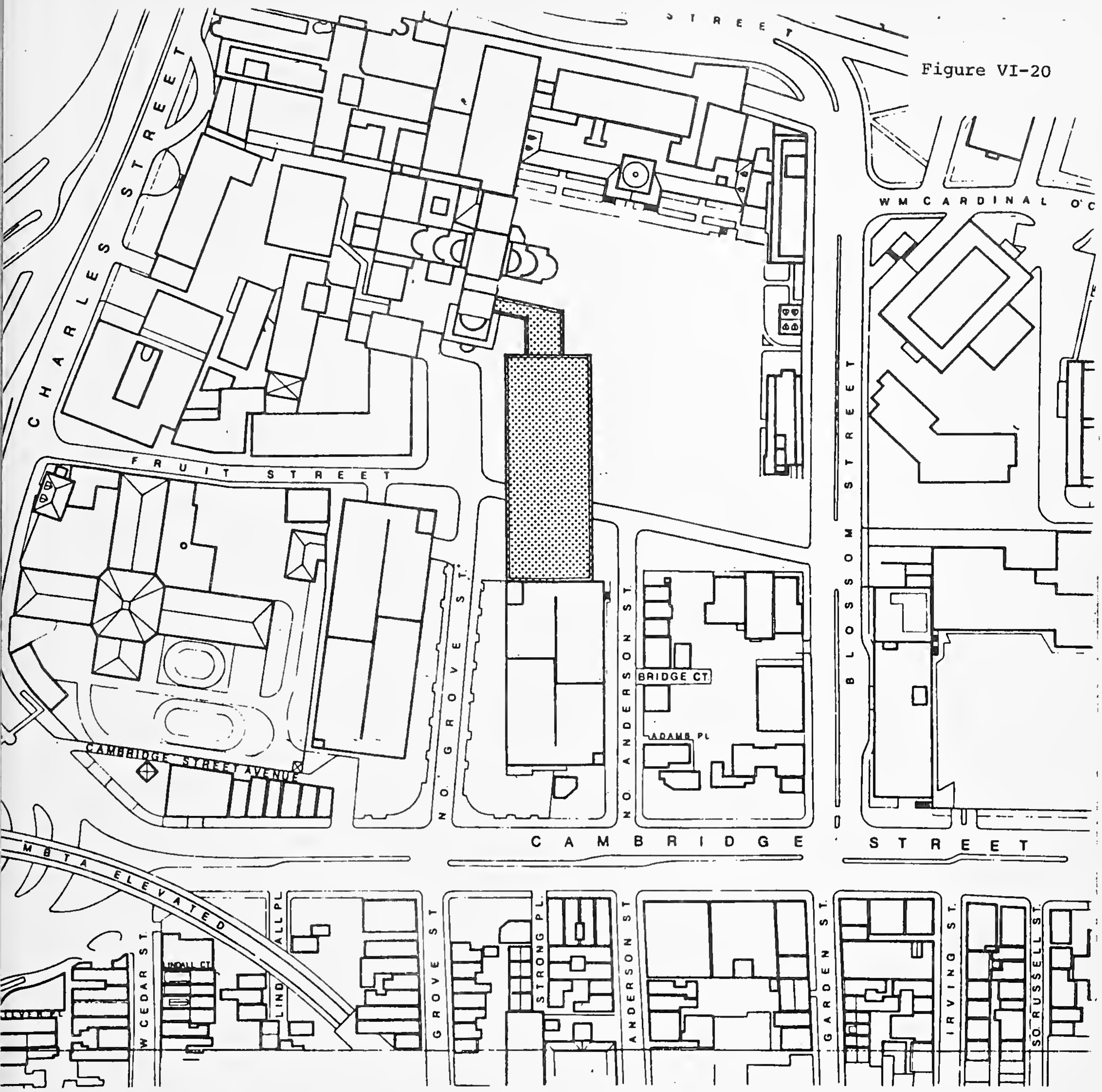
*A.F.E. Wise: This paper was presented at the Royalty Society Symposium 'Architectural Dynamics' Session 3 (iii) 'Effect of Buildings on the Local Wind', London, 1970, 26-27 February. This paper will appear in the published proceedings of the meeting. MCs (Tech), FI Mech E, FRSH.

Figure VI-20




# Ambulatory Care Center
## Environmental Impact Report

Prepared for

**Massachusetts General Hospital**
**C.S.C.D.C.**
**Massachusetts D.P.H.**

Prepared by

Resource Planning Associates, Inc.

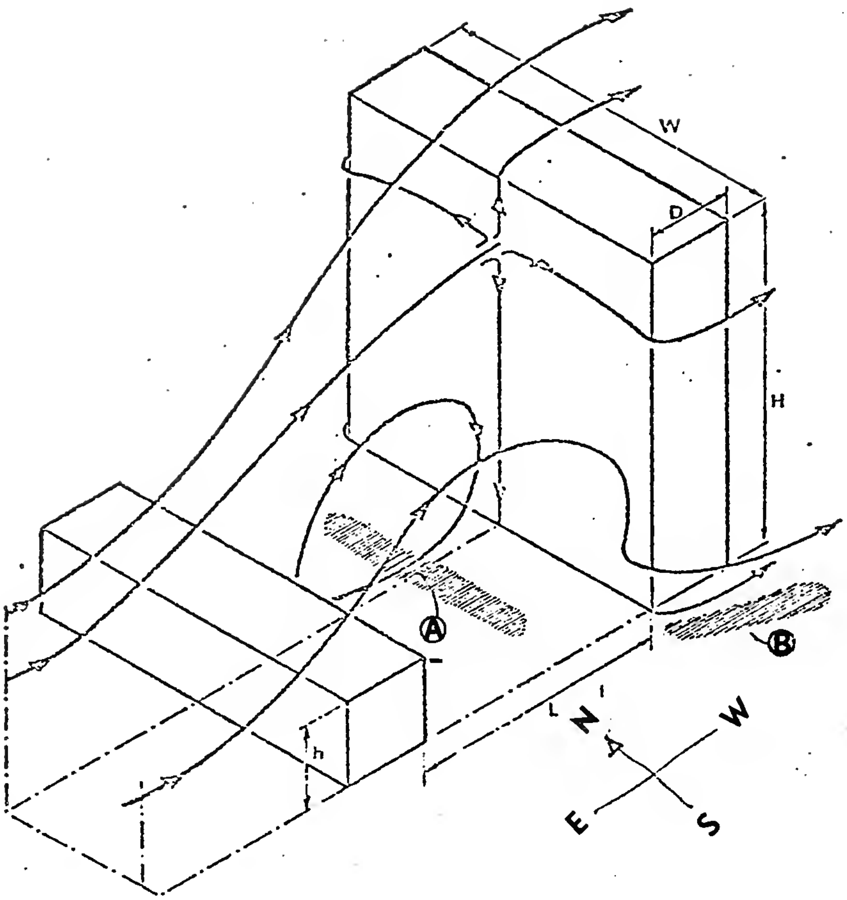
In association with

Wallace, Floyd, Ellenzweig, Moore, Inc.
Alan M. Voorhees and Associates, Inc.

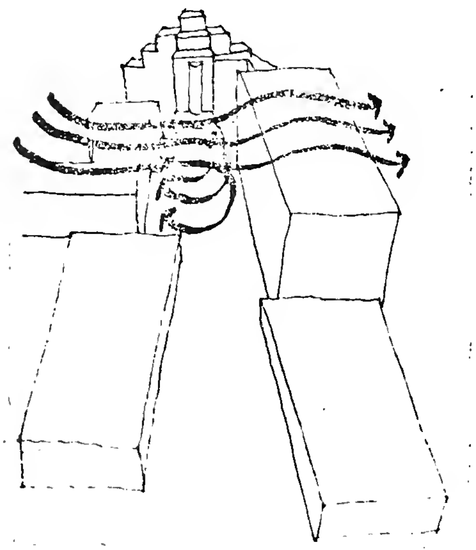
## CERTIFICATE OF NEED ALTERNATIVE

0 40 80 160 340 FEET

FEBRUARY 1975




(1)



(2)

# WIND EFFECTS

WIND PATTERNS WITH LOW BUILDING UPSTREAM OF HIGH BUILDING, WITH OPEN SPACE BETWEEN THEM

**Massachusetts General Hospital**
**C.S.C.D.C.**
**Massachusetts D.P.H.**

with a W wind), wind effects are amplified in the shaded areas marked A and B in the figure. The open space between the Clinic and the ACC (shaded A in the figure), and the garage roof (shaded B in the figure) will experience accelerated wind velocities. For the proposed building height, Wise gives data that indicate a 1.7 amplification in velocity in the A area. This is equivalent to an amplification of $(1.7)^2$ or about 3 times the wind velocity in terms of the wind pressure experienced by a person in the area. Actually, that area is now protected (Wise shows data indicating the wind is attenuated by one-half), and the above result is relative to an unprotected area so that the apparent pressure amplification could be even larger, i.e., 12 times the wind velocity in the protected area. Of course, the presence of Fruit Street and the MEEI upstream for W winds may alter the situation from the ideal one studied by Wise, but it seems likely some amplification would occur.

By contrast, the existing conditions at the MGH consist of two building masses of nearly equal height facing each other across an open space. Wise's data suggest that, given these conditions, attenuate wind effects to approximately one-half of free wind stream velocity effects. The existing White Building courtyard configuration, in effect, protects people from the free impact of the W winds.

To make the comparison of existing and proposed conditions clearer, consider a wind velocity = 1; pressure $(1)^2 = 1$. Then the wind speeds experienced by pedestrians would be 1/2 for existing conditions, while with the proposed ACC, wind speed would be 1.7. The respective aerodynamic pressures are thus $(1/2)^2 = 1/4X$ and $(1.7)^2 = 3X$. With the ACC, the changes in pressure experienced by pedestrians in the White Building Courtyard over existing conditions would be increased by a factor of 12.

The above discussion applies only to W winds which blow about 8 percent of the time on the average. The effects would be less severe when the wind was coming from the WNW or NW, although significant amplification of wind effects would probably still occur even then.

### Case 2: Building with a Ground-Level Opening

The second situation which has been studied extensively is case of the building with an opening in it. Again, the situation is that of a low building upwind, with an open space between it and a tall building. In addition, there is a large opening in the tall building at ground level. In this situation, the tall building brings the flow to rest on its windward face, and in so doing, creates a high-pressure region on the windward face, with the highest pressure being near the top. On the leeward side of the building, a low-pressure area is created near the top. These two wind pressures propagate down the building, and cause high wind velocities through the opening and at the corners of the tall building. Professor Bickness found velocities in the opening in excess of those at the top of the building. Again, the situation at MGH is much more complicated than that at the Green Building at MIT, where the hole problem existed and still does. It seems likely that there will be some high wind velocities in the proposed opening.

### Measures to Minimize Harm

From the foregoing discussion, it is clear that any building design for the ACC will have to take into consideration the results of specific wind tunnel studies on the design proposed. These studies will serve to determine the extent of the problem far more accurately than can be stated here. They will also make it possible to evaluate various means to reduce pedestrian level wind effects.

One approach to avoiding such impacts would be to change the building configuration and/or the relationship of the building to other MGH facilities. For example, although not yet designed, the ACC could be designed as a lower building or its long axis could be rotated 90 degrees so the building would extend east-west. This approach to reducing impact would have to be weighed against other approaches and against its effects when the building is actually designed.

Another approach to reducing the impact would require careful design of the ground floor and entrance areas of the building. Although the wind acceleration probably cannot be avoided without changing the configuration of the building, it is possible to design the building so that people

would never have to be in the windy areas. For instance, in the case of the area between the Clinics Building and the ACC, partial roofing and screens could be used to reduce the wind to acceptable levels. Moreover, should such a design approach be used, the opening in the building for vehicles could be kept small in comparison to the unloading area and the pedestrian lobby. Thus, high wind velocities would only affect vehicular traffic, thereby dispersing airborne pollutants. See the Chapter VII discussion of performance criteria for a more detailed description of measures to minimize pedestrian level winds.

## EMPLOYMENT

The Ambulatory Care Center will have beneficial affects on local employment, especially during the construction phase, but also, to a minor extent, when the ACC opens. The jobs which are created will temporarily aid a large number of unemployed construction workers, and permanently employ a small number of unskilled and semi-skilled building maintenance and security workers.

### Construction Employment

Although the ACC is not yet designed, it is estimated that approximately 15 months will be required for construction from the time when site excavation begins, to the period of interior finishing. Based on the construction of a similar-sized medical office building, it is estimated that approximately 50 construction workers will be employed during the first 5 months of the project for site excavation and foundation work. For the next 7 months, until the building is closed in, approximately 70 workers will be employed. During the final 3 months, 100 workers will be needed for interior finishing. When the MGH Grey Building was constructed, 160 workers were employed during the peak month of construction activity. The ACC is not expected to reach this peak since it will require less specialized installations than did the Grey Building construction.

This construction activity represents 1,040 man-months of effort over the 15-month construction period. Assuming an average monthly construction wage of $1,000, this effort translates into about $1 million in pretax wages to construction workers.

Employment of construction workers would have a beneficial impact on the depressed labor market. Approximately 20 to 30 percent of the City of Boston's construction force is now unemployed. At the proposed time of construction, work will be completed on the Massachusetts Eye and Ear Infirmary and at Charles River Park. Thus, this project will create a need for a large number of construction workers who might otherwise have difficulty finding work.

### Permanent Employment

Operation of the ACC will create new jobs for service personnel involved with custodial, security, and maintenance services. Some of these people will be recruited from other hospital buildings, especially the Moseley and Walcott buildings, but 30 new jobs will be created by the ACC, to be filled by people not now on the MGH payroll. Assuming an average annual wage of $6,000, this additional employment translates into $180,000 in personal income benefits annually.

All other staffing requirements will be met by inhouse personnel. No new doctors will be added to the staff when the ACC opens. Further, since the clinics' and private physicians' offices are already staffed with nurses, technicians, secretaries, and other support personnel, no increase in the number of other staff members is anticipated.

Not building the ACC would eliminate the construction and maintenance jobs. The selection of alternative sites would not change the employment figures projected for the proposed site.

## RETAIL TRADE

Retail establishments in the vicinity of the proposed ACC would experience very small but beneficial effects from the additional people coming into the area, both during construction and during operation of the ACC.

Construction workers are likely to patronize existing fast food restaurants, pubs, and grocery stores during their lunch break, but it is unlikely that the other retail establishments in the area would be affected at all.

As indicated in Chapter III, Description of the ACC, this facility will attract an additional 643 patients and visitors to the area daily. A personal interview survey was conducted by Dober & Associates of the shoppers in Charles River Plaza, the dominant shopping area on Cambridge Street near the proposed project site. The survey revealed that 10 percent of Charles River Plaza shoppers were in the area for appointments, most of which were medical. Thus, the expected increase in the number of patients and visitors at the ACC will result in a slight increase in the number of shoppers to the Cambridge Street area. Restaurants and convenience stores, such as drugstores and gas stations, would receive more trade, while service and specialty shops, such as repair shops, laundries, and real estate agents, would have little or no new trade as a result of the ACC. Because the ACC would be located closer to the Cambridge Street shops than is the rest of the hospital, a slight increase in employee shopping might also be anticipated. The increased expenditures by employees and visitors, however, cannot be estimated, but these increased expenditures can only be beneficial to the retail and consumer service area.

## ECONOMIC EFFECTS ON NEARBY LAND OWNERS

### Charles River Park and Plaza

Property owners near the MGH complex could potentially be affected by the new ACC, some positively and some negatively. Forty-one of the tenants in the Charles River Park are now MGH affiliated doctors, some of whom might move to the new ACC. This represents a potential loss of rental income of approximately $9,500 per doctor per year, computing rent at 1,000 square feet x $9.50 per square foot. If 25 doctors were to move, as anticipated by the hospital, the loss of income would be close to a quarter of a million dollars annually until the space was reoccupied. However, it is likely that the space vacated by the doctors would be attractive to other tenants, perhaps doctors, without extensive renovation. Since the vacancy will not occur until 1979, there should be ample time to locate new tenants.

See p. D-14.

In addition, during construction of the ACC, the hospital would need to rent 24,275 square feet of space to house the activities now located in the Moseley Building. If this space were rented from Charles River Park at $12 per square foot (the price of space in the newer buildings), Charles River Park would gain an additional $291,000 per year for the duration of the ACC construction. This would amount to nearly half a million dollars before the ACC was completed, which is considerably more than the potential loss.

In the long terms, the slight increase in retail trade in Charles River Plaza (see retail trade impacts which were just discussed) would have a minimal but positive effect on commercial rental income, and ultimately on property values as well. Additional activity in the area could stimulate retail sales, lower vacancy rates even further, and make the property an even more attractive and valuable piece of real estate.

### Other Property Owners

The ACC is not expected to have any impact on property values in Parcel 4B or nearby residential areas. Property in Parcel 4B is being purchased by the CSCDC to enable future development plans for the area. The Hospital and/or CSCDC already owns 75 percent of this parcel and hopes to own substantially all of it before construction begins on the ACC.

There will be no impact on apartment rents in the area since the ACC will not add an appreciable number of staff. The closing of the nurses' residence now in Walcott House is taking place in response to the elimination of the undergraduate nurses program. This program is being phased out independently of the ACC construction and will not cause any additional pressure on local housing which could ultimately change property values.

## MUNICIPAL SERVICES

The ACC would have an insignificant effect on fire and police services. The building would be protected by a sprinkler system, would conform to all fire regulations, and the height of the entranceway to the ACC would be sufficiently high to allow passage of fire trucks.

Crime prevention would be an important design consideration too. Due to the high number of automobile thefts in the project area, this criminal activity should receive special preventive emphasis. A better parking plan would assure patients and visitors garage space, which would make parking safer, as well as help eliminate illegal parking in fire lanes. Removal of the temporary building would eliminate a dark, unused building and open up the Bulfinch Building courtyard at night. Limited access to the ACC would help control unauthorized entry and an enclosed bicycle parking area would discourage theft.

## RELOCATION

See pp. D-17, 18, 19.

The ACC would not cause any residential or commercial relocation. The only relocation will be of medical activities associated with the ACC or the buildings being demolished.

### Relocation Requirements

Construction of the ACC will require the relocation of many of the activities now in the Moseley and Walcott buildings. Some activities, in particular the nurses residences, will not be relocated because the activity is being discontinued for reasons unrelated to the construction of the ACC. The waste handling facility, oxygen tank and bicycle parking area will have to be moved to make way for construction. The oxygen tank is too close to an existing building and has to be moved anyway. The activities being relocated and their new locations are shown below in Table VI-29.

TABLE VI-29
RELOCATION OF ACTIVITIES
NOW IN MOSELEY AND WALCOTT

| Activity | Space (Sq. Ft.) | New Location: Temporary | New Location: Permanent |
|---|---|---|---|
| Data processing, Medicare records, personnel, administration and accounting | 24,275 | Charles River Park | ACC |
| Library and house staff quarters | 29,711 | -- | Bartlett Hall |
| Maintenance, employees' facilities, housekeeping | 8,201 | Temporary Building #2 | Clinics Building |
| Education | 8,852 | | Ruth Sleeper Hall |
| Social services | 1,000 | | White Bldg. |
| Chaplaincy | 750 | | Warren Lobby |
| Research offices | 506 | | Gray |
| Security | 225 | | Clinics |
| Maintenance shop, conference room, public space, mechanical equipment, dormitories | 27,626 | Space to be eliminated | |
| Personnel, patient care representatives, some administrative and accounting | 3,800 | Not yet assigned | |

Now sites for the waste handling facility, oxygen tank, and bicycle parking area have not been finalized. The waste handling facility, which requires approximately 2,500 square feet, must be accessible from the street so that the trucks will be able to collect the wastes. It must also be accessible to the hospital complex to avoid waste handlers being exposed to adverse weather conditions. The basement of the Jackson Towers meets these criteria. Another posibility is to build a new facility along Blossom Street or beneath the Bulfinch Building courtyard.

The oxygen tank site must conform to state regulations concerning distance from hospital buildings. The existing tank is considered inadequate to serve the needs of the MGH, MEEI, and the Shriners Burns Institute. Moreover, the tank is located too close to existing buildings.

The bicycle parking area will be coordinated with the traffic circulation pattern.

# VII - DESIGN AND PERFORMANCE CRITERIA TO MINIMIZE HARM

## INTRODUCTION

As indicated in Chapters III and IV, the Ambulatory Care Center has not yet been designed. While this creates some conceptual difficulties in performing the environmental impact assessment, it also offers a clear opportunity for using the process of environmental review to ensure that potential adverse effects are minimized, and that existing problems are ameliorated to the maximum extent possible.

In assessing the environmental effects on the ACC, it is clear that these effects are of two sorts. Some impacts are generic - that is, they depend primarily on the volume of activity generated by the ACC. Others are design-specific, and depend on the particular physical configuration of the ACC structure. Examples of the first type are economic effects and utility loads. An example of design-related impacts is aesthetics. Transportation impacts are of both kinds, in that the volume of cars is a function of use and the measures to minimize harm are specific to the building design. For these design-specific impacts, it is important to specify measures to minimize harm which will guide the architectural design but will not limit the ability of the project architect to respond to specific program needs.

To resolve this potential conflict, the environmental team has specified "performance criteria" for each critical impact category. A performance criterion, in this context, is defined as a standard or guideline against which the design of the project should be evaluated. In each area of potential impact (e.g., transportation) the project design should, if possible, "perform" to the level of the criterion.

The fulfillment of all of the performance criteria will be very difficult, in fact, impossible. Difficult trade-offs must be made between the criteria in many cases where they conflict. For example, achievement of the criteria for minimizing pedestrian-level wind effects will work against achievement of the criteria for minimizing the impact of the building on views. In cases where two or more criteria cannot be satisfied simultaneously, the seemingly conflicting criteria serve to make explicit what environmental goals must be abandoned if the major objectives of the project are to be achieved.

This final chapter of the impact report first establishes the minimum performance criteria, by impact category, that any design of the ACC should satisfy in order to minimize design-specific impacts. Within each impact category are then presented examples of how these criteria might be met. These examples are not intended to limit the architect, but to stimulate his thinking, and to demonstrate that the criteria can be met successfully. The eventual design of the building should succeed at least as well as do the examples in meeting the criteria, and hopefully better. After all of the performance criteria and examples have been presented, the chapter closes with a discussion of the most important trade-offs between them. These examples represent the environmental team's judgment as to which trade-offs are preferable. The architect will be able to judge better how these trade-offs should be made, since he will have a more comprehensive understanding of the interior functions, their required environment, and their relationship to the external environment.

## WIND

### Criteria

The ACC should be sited and designed so that it does not amplify pedestrian-level winds more than 1.2 to 1.4 times the free wind speed in the vicinity of the lobby entrances, building court-yards, or other places where pedestrians are likely to stand or walk.

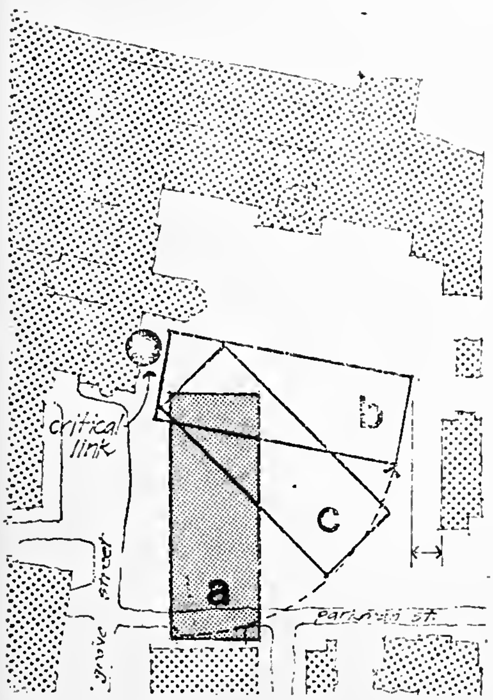
The ACC should be designed so that pedestrians are not required to stand or walk for a significant distance in areas that are now exposed to high velocity winds.

The building design should not induce stagnation or standing vortex areas which would result in high concentrations of airborne pollutants. (See Chapter VI air quality discussion.)

The basic concern here is to avoid building characteristics which, when combined with existing site conditions, would result in excessive pedestrian-level wind velocities (more than 1.2 to 1.4 times free wind speed), especially with W or WNW winter winds. It is expected that wind tunnel tests will have to be conducted as part of building design to ensure that these criteria have been met.

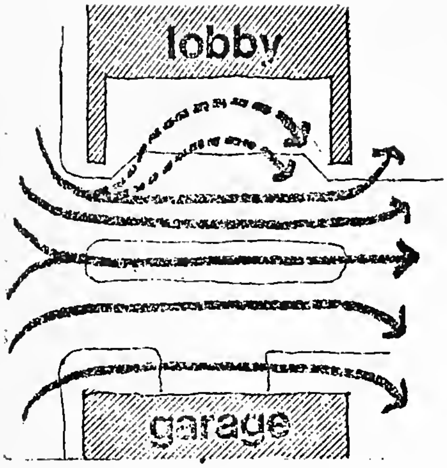
### Examples

Given the site and link requirements, the ACC can be located anywhere along the arc shown on the accompanying drawing; that is: A - parallel to North Grove; B - perpendicular to North Grove; C - at some angle to North Grove.

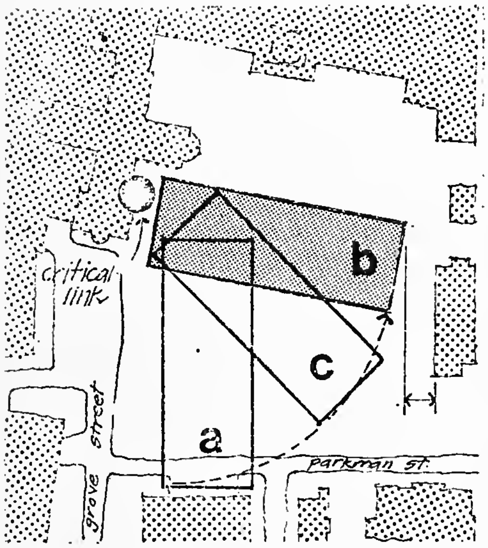



Alternate A1: As shown in the Certificate of Need application, the ACC is exepcted to present winter wind problems. The chief difficulties presented by this alternative are due to the orientation of the building mass and the opening in its base for Parkman Street.

Given the basic alignment of the ACC axis parallel to North Grove Street, it may be possible to reduce pedestrian-level winds by a number of devices. For instance, designing the lobby and entrances area according to the scheme shown would probably reduce wind velocities to an acceptable level at the door area itself. This particular design does not mitigate wind problems for pedestrians in other areas, for example, along North Grove Street. The effect of proportional relationships between height, length and width, the ACC, other buildings, and open space dimensions would have to be determined by wind tunnel testing.

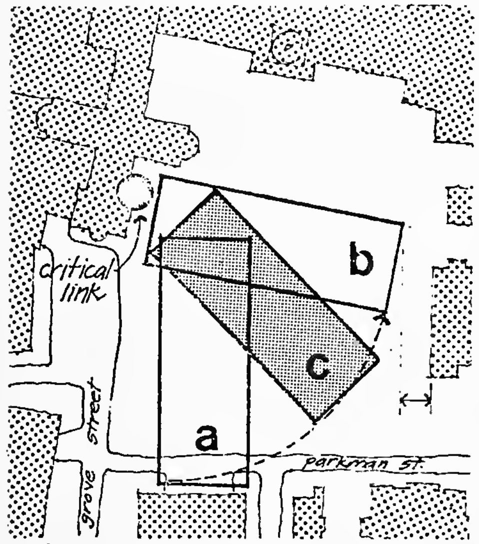



Alternate A2: If Parkman Street were not re-aligned to match Fruit Street, and the same lobby configuration were kept, but moved down to existing Parkman Street, the effect of moving the opening through the building mass to the edge might reduce wind velocities through the opening. It could also reduce the distance pedestrians would have to walk in areas of high wind velocities.




Alternate B: By orienting the ACC perpendicular to North Grove Street, the amplification of W and NW winter wind is avoided since no barrier is presented to these wind movements. Winds from other directions probably do not present problems of pedestrian comfort because breezes from the SW and SSE are normally warmer.

With the ACC in this location, the proportions of building volumes to open space between structures is such that a noticeable standing vortex would probably not be generated either in the Bulfinch or White building courtyards by winter or summer winds. Circulation and access can be adapted to service this configuration. Thus, under Alternate B pedestrians would be exposed to the same or better conditions than at present.




Alternate C: By orienting the ACC at some angle to North Grove Street, the associated wind impacts would be somewhere between those of the other two alternatives considered. The precise building angle and configuration to North Grove Street, which would both remove the necessity for vehicular access through the building, and prevent creation of a significant standing vortex, would have to be carefully determined by wind tunnel testing.

## AIR QUALITY

### Criterion

The ACC should be designed so that it does not cause air quality in the impact area to exceed primary air quality standards promulgated by the Environmental Protection Agency for carbon monoxide, oxides of nitrogen, and hydrocarbons.

The basic concern is to avoid a combination of traffic circulation patterns and building-induced air stagnation or standing vortex areas which would result in concentration of airborne pollutants. Design must therefore be such that idling and slowly moving vehicles are located in areas with adequate air circulation.

### Examples

Alternate A: In the sample designs shown as Alternatives A1 and A2 in the preceding discussion of wind, standing and slow moving vehicles are located in what is effectively a Venturi connection between sides of the building. Since most of the ACC and visitor traffic would pass through this opening, concentrations of pollutants are not expected. However, the effect of this solution along North Grove Street and the White Building courtyard is not certain. A standing vortex may be created along North Grove Street and in the White Building courtyard, as shown, by virtue of the ACC acting as a barrier to W and WNW winds. Wind tunnel testing would be needed to determine this accurately. Such a vortex would, of course, prevent dispersion of air pollutants in the courtyard. The occurrence of the vortex depends on porportional relationships of the building dimensions which are not yet established. Wind tunnel testing would be necessary to establish the magnitude of the vortex problem.

Alternate B: With the ACC in the Alternate B location, the proportions of building mass to open space between structures is such that a noticeable standing vortex would probably not be generated.

Alternate C: This orientation would probably prevent formation of a significant standing vortex that would trap air pollutants.

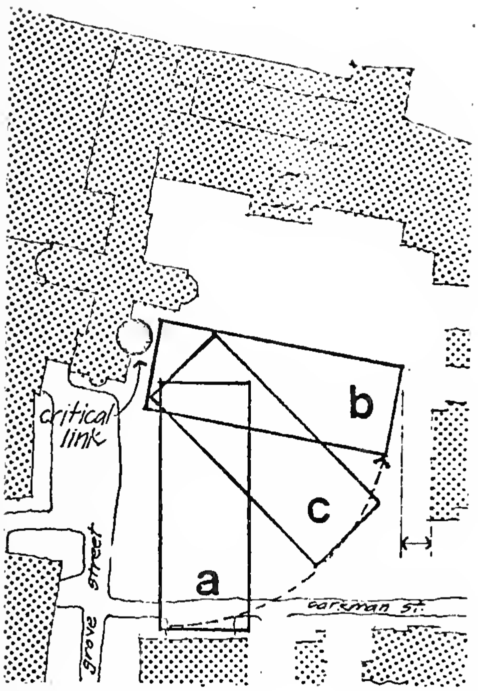
VIEWS

Criterion

The ACC should be sited and designed so as not to block major views from Staniford Street Towers, Blackstone Housing for the Elderly, or Beacon Hill, which are or would be visible without the ACC.

Examples

Given the site and link requirements described earlier, the ACC can be located anywhere along the arc shown in the accompanying drawing; that is, A - parallel to North Grove Street; B - perpendicular to North Grove Street; C - at some angle to North Grove Street.




Alternate A: This location is the condition described in the Certificate of Need alternative. It has no major impacts on views from neighboring buildings.

Alternate B: This approach locates the ACC parallel to North Grove Street. From Staniford Street Towers and Blackstone Housing for the Elderly, views would be wholly unaffected. However, from down North Anderson Street and along Parkman Street, the views of the Bulfinch Building would be blocked.

Alternate C: This approach would probably block the view of the Bulfinch Building from down North Anderson Street. Other view impacts would be somewhere between those of the other two orientation alternatives discussed above, and would depend on the particular angle and massing of the ACC.

Other measures: Without a precise architectural program, it is difficult to tell whether the ACC envelope (height, profile, width, etc.) can be changed without affecting functional efficiency and flexibility. From a medical space-use point of view, neither towers, nor square-designed buildings, nor long skinny buildings are particularly desirable because these designs limit the depth and variety of office suites that can be accommodated.

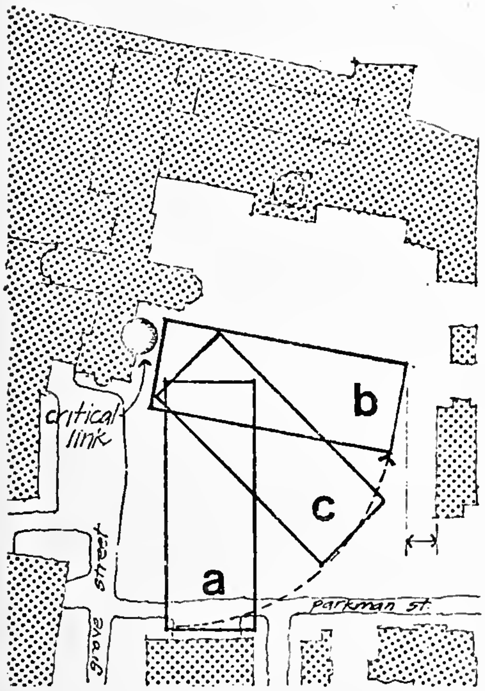
## SHADOWS

**Criterion**

The ACC design should nct lead to keeping the courtyards of either the White or Bulfinch buildings in shadow all or most of the day during the winter solstice.

**Examples**

ACC effects on shadow depend chiefly on building orientation and profile.




Given the link to the White Building, the possible orientations are as shown. The shadow effects of Alternate A have already been discussed; Alternate B would cast the Bulfinch Building, its dome, and its courtyard into perpetual shadow, while exposing the White Building courtyard to year-round sun; Alternate C would have less severe effects on the Bulfinch Building area and will shade part of the White Building courtyard in winter.

The number of floors at any given point along the length of the ACC would affect the shadows it casts A stepped building, for example, could reduce shadow effects in such places as the Bulfinch and White buildings courtyards. Without a precise architectural program, it is difficult to evaluate the effect that a change in floor areas such as a stepped design, would have on medical uses. Thus, shadow effects are something only the eventual ACC architect can assess with certainty.

NOISE LEVEL

Criterion

Noise from construction of the ACC would be controlled in order to meet the proposed standards of the Boston Air Pollution Control Commission as fully as possible (Regulations for the Control of Noise in the City of Boston, Regulation 4, proposed January 1975). This standard requires that the noise level rating of construction activities not exceed 75 dBA at the lot line of the nearest residential structure. The noise of operation of the ACC (from air supply, exhaust, heating, and cooling systems) should not be higher than the existing ambient noise level in the area.

Examples

The methods used in order to meet the proposed standard will be those ultimately agreed on by the contractor, MGH, and CSCDC as being most cost-effective. The range of possible options has been outlined in Section VI of this report. If, however, other methods, not mentioned, are better alternatives, they should certainly be used.

The noise made by the air supply, exhaust, heating, and cooling systems will be minimized by following current guidelines of the American Society of Heating, Refrigeration, and Air Conditioning Engineers for design of these systems (ASHRAE Guide and Data Book Systems, 1971). Other techniques that have been developed for design and operation of hospital buildings to insure low interior noise levels (Noise in Hospitals, U.S. Public Health Service, 1963) will also be considered during architectural design of the ACC.

## HYDROLOGY/GEOLOGY

**Criterion**

The ACC should be designed and constructed in a manner that would prevent damage to its own foundation and that of adjacent buildings. Any significant differential settlement or distrubance to the water table in the area must be prevented.

**Examples**

Preliminary geotechnical studies, as previously discussed, indicate that the ACC could be founded on a reinforced concrete mat. The basement area would have to be waterproofed and the mat foundation structurally designed to resist hydrostatic uplift, thereby preventing any adverse change in long-term groundwater levels. To prevent differential settlement problems, the connection with the White Building would be made by use of structural measures, such as a flexible rather than rigid link. If design-phase geotechnical studies reveal that the ACC would be subject to adverse long-term settlements with a mat foundation, the building could be founded on deep piles bearing on the underlying glacial fill or bedrock.

A temporary lateral support system and excavation dewatering will be required during construction. Depending on the results of design-phase geotechnical studies, the system used would be either a slurry wall, steel sheet piling. or steel soldier-piles and wood lagging.

## UTILITIES

**Criterion**

The ACC should permit easy access to the utilities considered necessary for service to other users, Boston water and sewer system usage being the major concern.

The ACC should not interrupt service to nearby buildings, either during construction or afterwards.

ACC operation should not overload or exhaust existing utility capacities, especially water and sewer.

**Examples**

Although the proposed ACC appears to have no serious utility impacts, it is impossible to estimate its exact impacts on water and sewer loads without conducting a survey. There are two major reasons for this: first, it is not absolutely certain that the Parkman and Fruit Street utilities serve only MGH; and second, utility loads of surrounding uses and capacities of adjoining water and sewer lines are not yet known with precision. The chief concern which can thus be addressed in this study is to ensure the maintenance of the function and access to those utility lines (if any) which would have to be realigned for the ACC.

The Certificate of Need alternative meets these requirements, providing that the utilities in question (those under existing Parkman Street and the closed-off portion of Fruit Street) are relocated under the realigned Parkman Street. Two other possible approaches to the maintenance of utility functions and access are: to pass the lines through the ACC basement; or to relocate the ACC sufficiently far from the Parkman Street garage to allow an easement of loads. The first method presents difficulties, particularly if the building should settle. The second method is to some extent dependent on building siting decisions, but is by far the simplest if it is possible to abandon the Fruit Street utility lines.

## VEHICULAR CIRCULATION

### Performance Criteria

This section describes the performance criteria that have been developed for traffic circulation, and several schemes that could be implemented to alleviate existing and anticipated circulation problems. These schemes also address the general issues and impacts previously identified in the discussion of traffic and parking (Chapter VI). They also conform to the goals stated for MGH and the ACC in the CSCDC Context Plan, dated July 1974, which were stated as follows:

- Modify the existing street pattern to provide safe access to and through the area.
- Separate pedestrian and vehicular traffic.
- Minimize traffic impact from increased density.
- Improve circulation.

From the analysis conducted as part of the current study, the above goals have been translated into the following performance criteria on circulation for the ACC.

- To the extent feasible, site penetration to the MGH-MEEI complex should be restricted to only those vehicles having either institution as their destination.
- Main flows should ring the complex via Charles, Blossom, and Cambridge streets; minor flows should utilize penetration roads intended for their use when their destination is only in a particular portion of the complex to which these roads lead.
- Flows should be balanced, insofar as possible, among ring and penetration roads to reduce congestion potentials on any one roadway.
- Functional separation of traffic by type of vehicle and trip purpose should be sought - a particular aim being to draw major traffic flows away from emergency access routes - streets bearing ambulance usage. Illegal parking and standing on emergency access routes should also be discouraged by strict enforcement of tow zone restrictions, functional separation, and removal of taxi stands from such access routes.

- Pedestrians should be separated from main traffic flows where possible through grade separated sky-walks or bridges. Where not possible, provision should be made for cross-walks, pedestrian-activated signals, and safety islands.

- Use of public transportation and other non-automotive modes should be encouraged by all possible means to reduce traffic volumes and parking demands.

Three basic schemes have been devised which respond to these criteria in varying degrees:

- Scheme A -- No Build

- Scheme B -- Parkman-Fruit Through Street

- Scheme C -- Parkman Cul-de-Sac

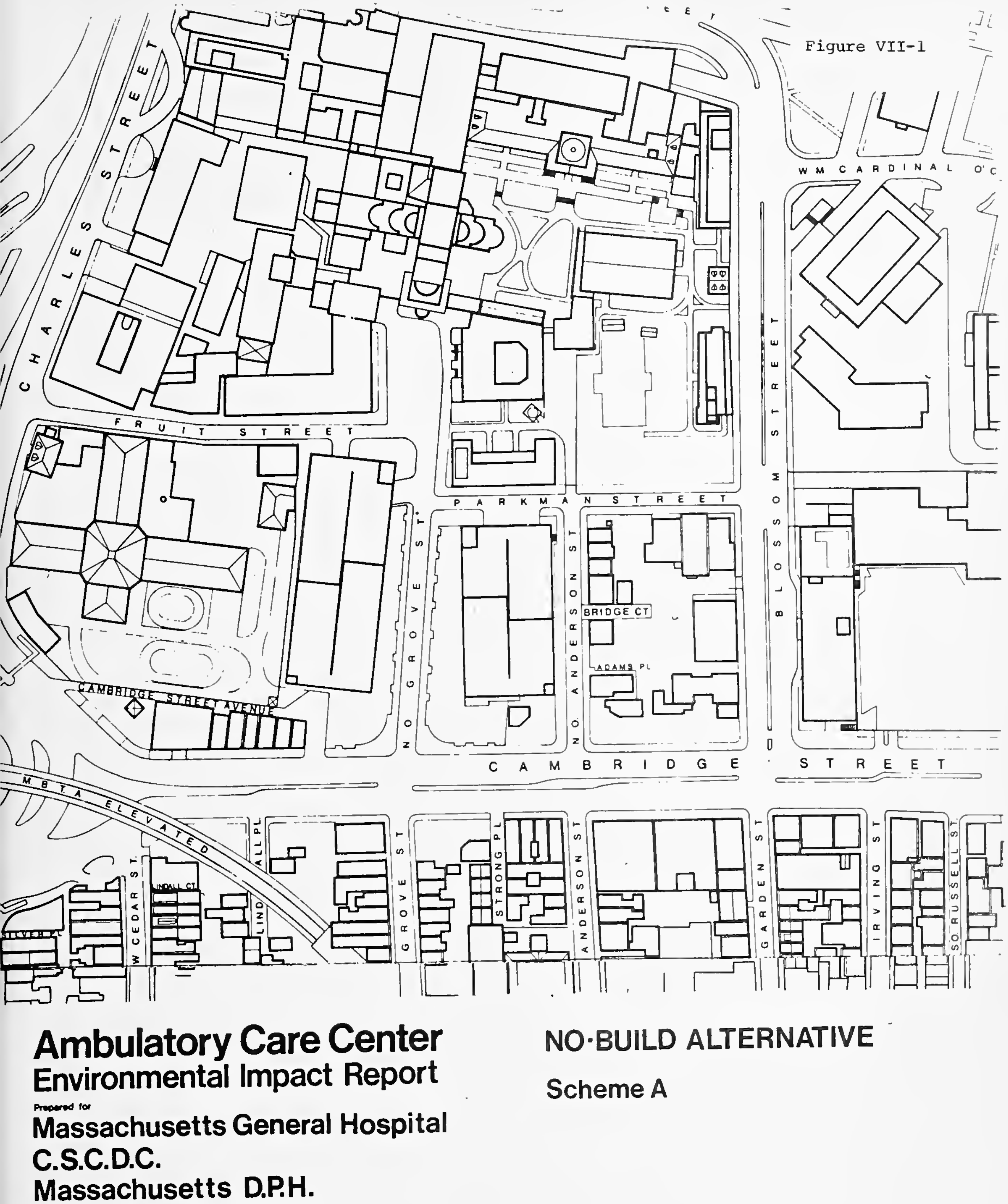
The three basic schemes and their variants are shown schematically in Figures VII-1-VII-5. For each scheme, there are minor variations, mainly involving direction of traffic on one-way streets and possible conversion of one-way to two-way operation. However, a major difference exists in two options for Scheme B: one alternative, B1 (the Context Plan), calls for a realignment of Parkman Street at an angle, more directly intercepting Fruit Street at N. Grove. A second alternative, B2, calls for widening Parkman Street in its present location for two-way operation. Two major variants of Scheme C also exist: C1 proposes a cul-de-sac turnaround in line or parallel with Parkman Street while C2 calls for a turnaround at right angles to Parkman.

Constraints

Several constraints limit the range of alternatives available for solving circulation and parking problems. These constraints are noted below.

- Building lines, especially on Fruit and N. Anderson streets, prevent the widening of these streets to accommodate two-way traffic by the addition of a moving lane. While the streets could function as two-way streets according to their present widths, the elimination of parked and standing automobiles to free up a lane is unrealistic due to MEEI taxi stand needs (Fruit Street) and the existing low level of parking ban enforcement. Widening of both streets is

Figure VII-1




# Ambulatory Care Center
## Environmental Impact Report

Prepared for
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**C.S.C.D.C.**
**Massachusetts D.P.H.**

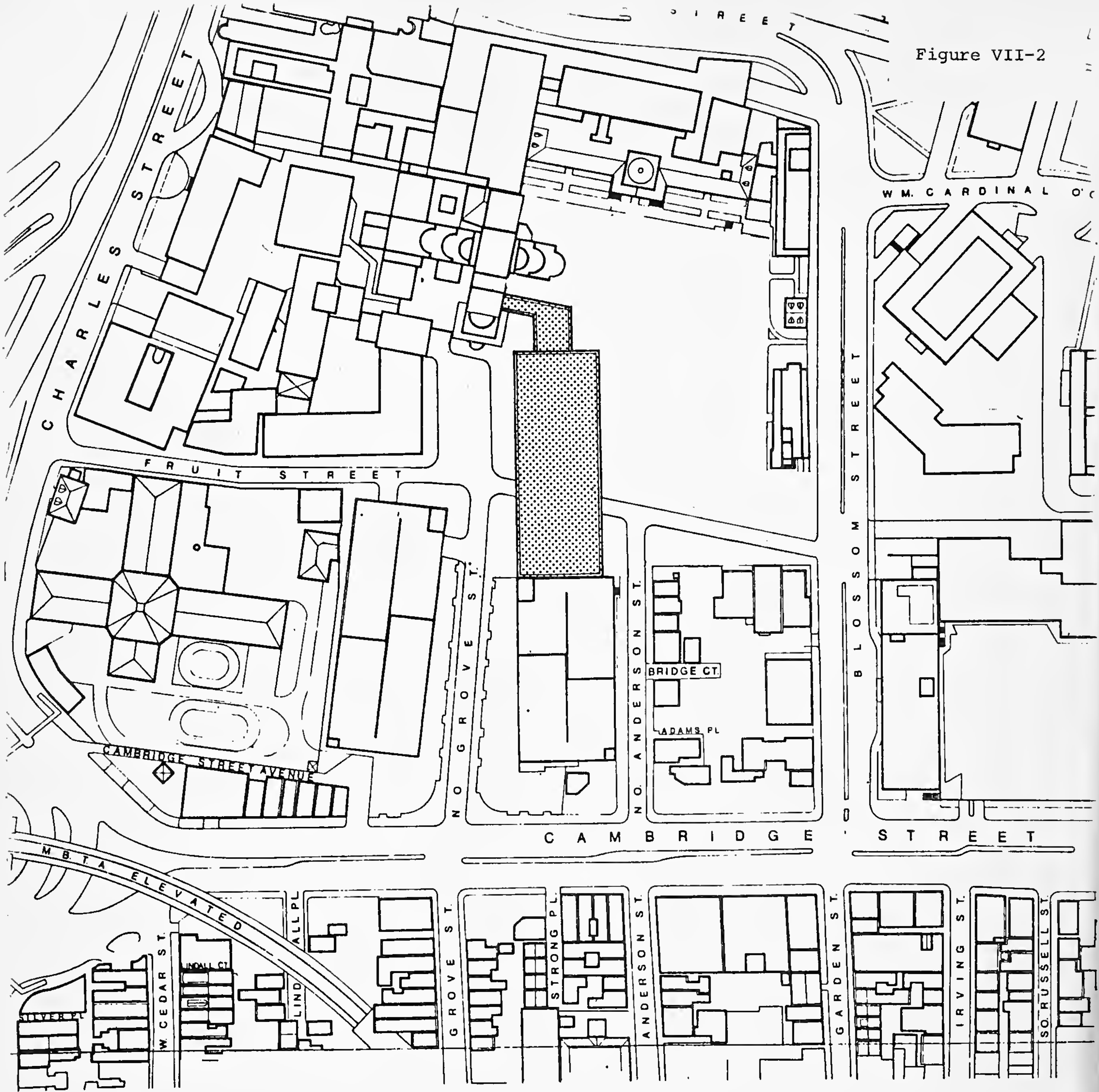
Prepared by
Resource Planning Associates, Inc.
In association with
Wallace, Floyd, Ellenzweig, Moore, Inc.
Alan M. Voorhees and Associates, Inc.

## NO·BUILD ALTERNATIVE

### Scheme A

0 40 80 160 240 FEET

FEBRUARY 1975

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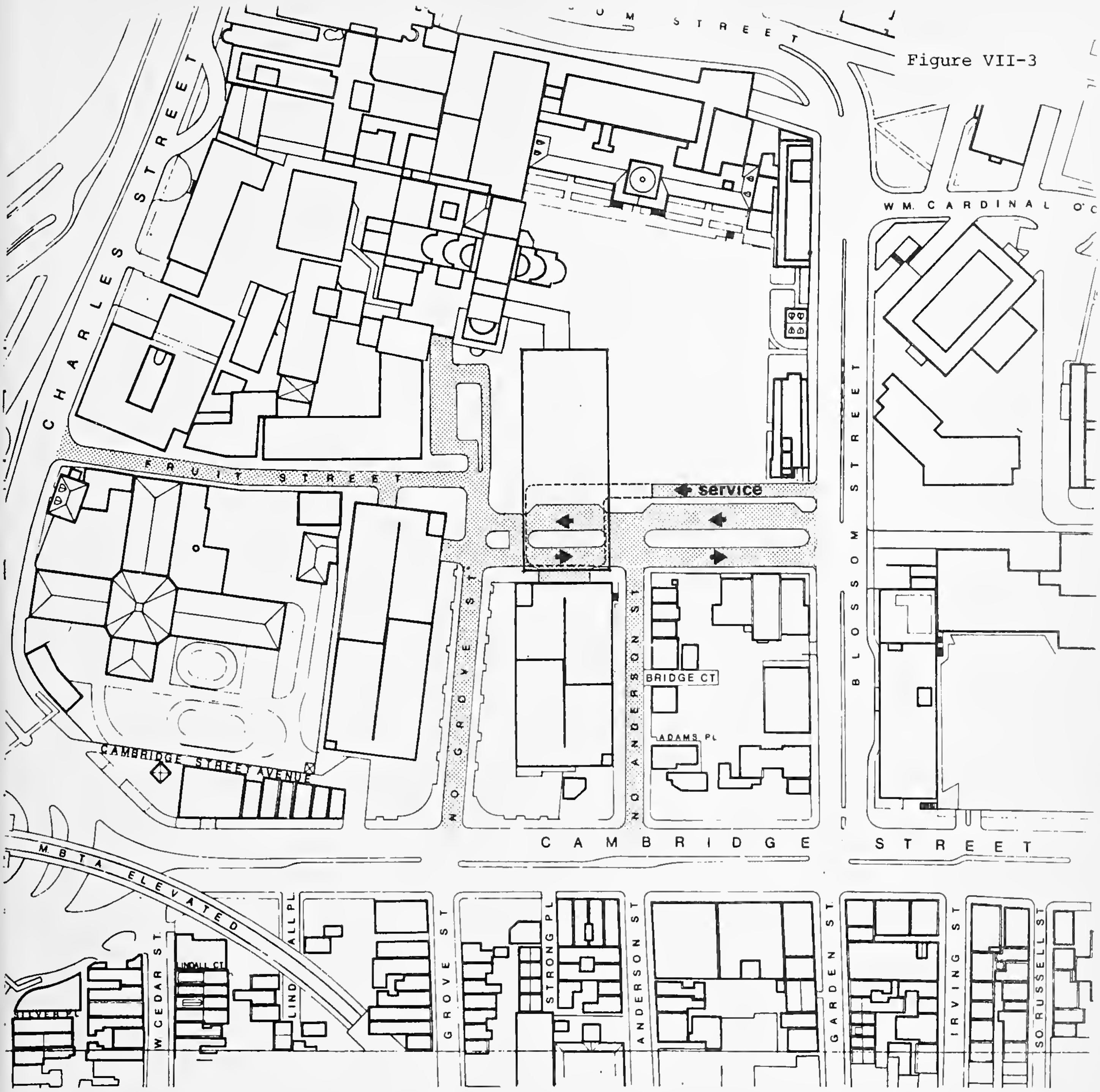
## CERTIFICATE OF NEED ALTERNATIVE
## Scheme B1

FEBRUARY 197

Figure VII-3

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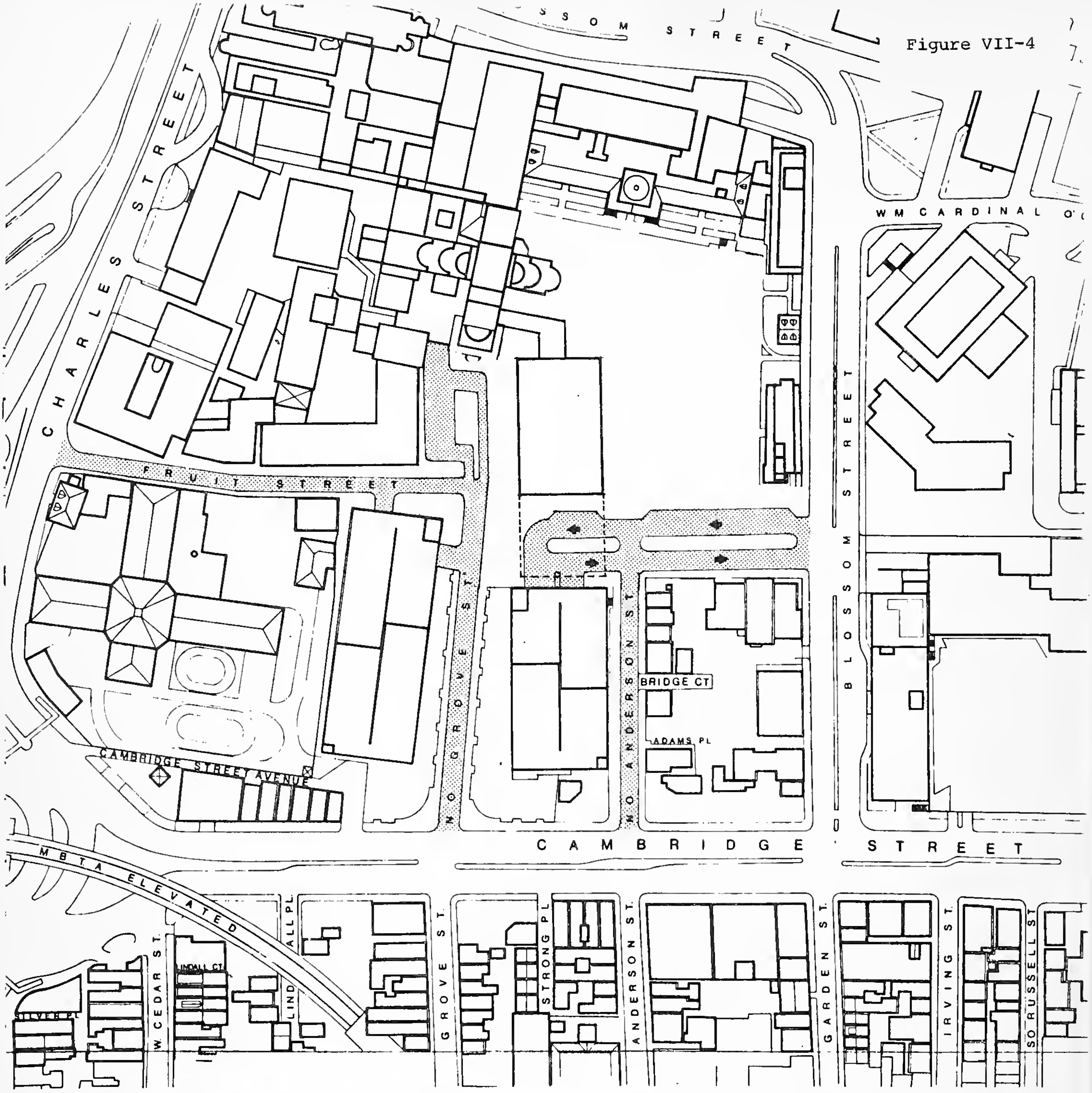
## MEASURES TO MINIMIZE HARM
## Scheme B 2


FEBRUARY 1975

Figure VII-4

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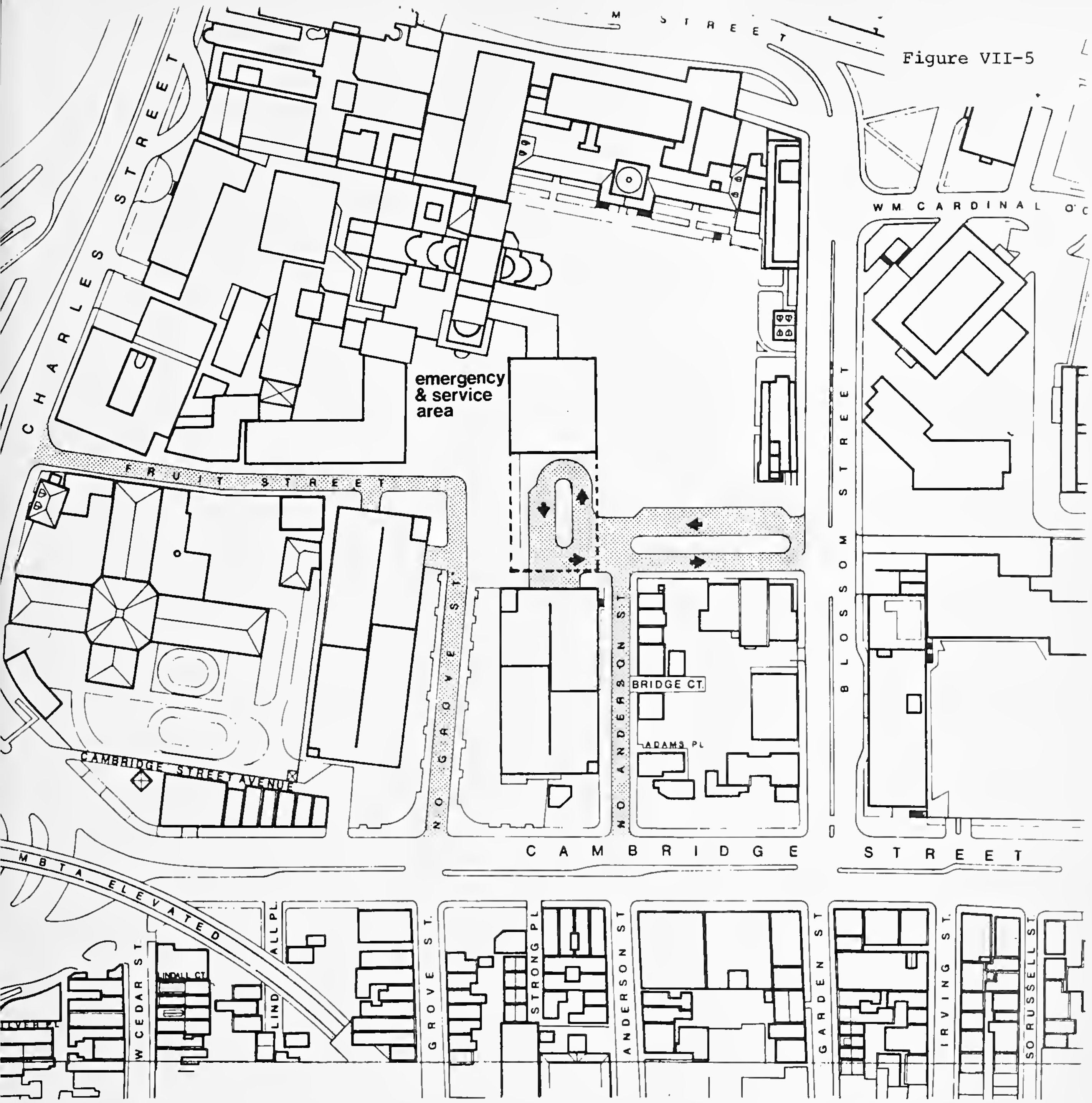
## MEASURES TO MINIMIZE HARM
## Scheme C I

FEBRUARY 1975

Figure VII-5

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## MEASURES TO MINIMIZE HARM
## Scheme C 2


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a prospective future outcome of redevelopment proposals presently under consideration for the Suffolk County Jail site and so-called Parcel 4/B in the block bounded by Cambridge, Blossom, Parkman and N. Anderson streets.

- One-way patterns now in existence for Fruit, Parkman and N. Anderson streets are the most logical patterns, given the present and prospective pattern of building and garage entry/exit points. The new main entrance to MEEI will face Fruit Street (formerly it faced Charles). The present one-way direction of Fruit is correct in that it causes the passenger door of autos and taxis to be nearest the entrance for the safety and convenience of drop-off passengers. Location of the MGH clinic entrance and the entrance to the Fruit Street parking garage reinforce the correctness of the existing one-way direction from N. Grove to Charles Street. The one-way patterns on Parkman and N. Anderson also appear correct from the standpoint of allowing ease of entry to and exit from the Parkman Street parking garage for traffic using N. Grove Street, the main entry street for MGH. While reversal of the one-way direction of N. Anderson Street could remove some traffic from N. Grove Street, the absence of any major traffic generators in the Parcel 4/B block makes this a minor consideration as against the larger volumes seeking egress routes from the Parkman Street garage.

- Utilities, including sewer, water, and gas mains, run under Parkman, Fruit and Grove streets. This utility placement tends to limit or make more expensive the relocation of streets and the construction of new buildings in existing rights-of-way that would disrupt the lines or make them less accessible for servicing.

- The so-called "XY" Building in the Context Plan (Scheme B1) would form a constraint if revived as an active proposal. In the course of this study it was understood that the "XY" Building had been dropped from further consideration.

Scheme A: No Build

Features: This scheme assumes the ACC is not built and that the existing street system remains basically "as is" in the absence of a major revision in the land use or building location pattern which could form a catalyst for change in the circulation system. There are some measures that could be taken under a "no build" scheme to improve circulation and parking for existing land uses and buildings. These measures include the following.

- Interconnect the MDC Charles Circle and the City of Boston Cambridge Street signal systems and retime signals to assure better progression.
- Implement one of the three rebuild schemes for Charles Circle-Charles Street-Storrow Drive devised for Metropolitan District Commission (MDC) by Alan M. Voorhees & Associates, Inc., 1973.
- Install left-turn signals at Blossom and N. Grove streets as called for originally in the TOPICS project plans, specifications and estimates.
- Energize pedestrian signal buttons on Cambridge Street (installed but not hooked up).
- Install directional sign at Cambridge and Blossom streets directing Leverett Circle-bound traffic to Blossom Street.
- Widen and rearrange pedestrian bridges at Charles Circle per Alan M. Voorhees & Associates' schemes for MDC.
- Enforce all two zone and no parking restrictions on N. Grove, Fruit, and Parkman streets.
- Repave Parkman and N. Anderson streets.
- Widen Parkman, Fruit and N. Anderson when feasible, for possible two-way circulation or freer one-way circulation.
- Inter-tie MGH and MEEI to Charles MBTA Station and parking garages via elevated, enclosed walkways.

- Widen N. Grove Street at Cambridge Street to create two departure lanes for exiting N. Grove Street traffic, and a taxi holding lane along the eastern side of the roadway.

- Discourage the use of N. Grove Street for employee drop-off and encourage the use of Blossom Street for this function.

- Encourage the establishment of employee car pools by offering intend matching techniques.

- Explore further the utilization of off-campus parking lots serviced by the existing shuttle bus.

- Restructure internal parking policies to discourage long-term low revenue producing use of the garage.

- Encourage the increased use of both the Charles Street and Science Park MBTA stations by offering internal incentives.

- Explore the possibility of the establishment of an MBTA bus routed along Blossom Street.

<u>Scheme B: Parkman-Fruit Through Street</u>

<u>Features</u>: This scheme assumes that the construction of the ACC provides an opportunity for restructuring the street system penetrating or adjacent to the MGH campus. The Context Plan and Certificate of Need Application both propose the realignment of Parkman Street to form a more direct through east-west connection with Fruit Street (Scheme B1). The Context Plan presents the following features in its circulation package:

- A new east-west alignment for Fruit Street and Parkman Street

- A slight modification to the upper part of N. Grove Street (a wider courtyard area with a landscaped traffic island at its center)

- The use of N. Anderson Street as the main service route to Block 4/B

- Pedestrian walkways connecting to the garages, the health care facilities north of Parkman Street, Charles River Plaza, and possibly across Cambridge Street to Block 4/A

- Interior access to hotel, upper level commercial space, and recreation center from the galleria courtyard

- Main ACC entrance facing White Building courtyard between Parkman Street and White Building entrance

- The ACC would be built in air rights over the realigned Parkman Street.

A variant on this scheme (B2), that emerged from the design of measures to minimize harm in the present study, widens Parkman Street in its present location; adjusts the angle of Fruit Street to make the jog less pronounced, and places the ACC main entrance for vehicular drop-off under the building for weather protection.

Advantages: Scheme B has the following advantages.

- Reduces the job at N. Grove Street permitting more direct routing of through Parkman-Fruit traffic

- Encourages potential widening for Fruit Street to complete the two-lane two-way Fruit-Parkman system crossing the MGH complex

- Preserves N. Grove Street as the MGH main entrance

- Preserves flexibility in choice of either of the two parking garages, both of which are accessible from N. Grove Street

- Maximizes the number of access routes for firefighting equipment

- Maximizes the number of access routes for ambulances in case of à disaster.

Disadvantages: Scheme B has the following disadvantages.

- The retention of N. Grove Street as the primary entrance to the MGH campus creates the likelihood that the high volume of traffic (causing congestion, illegal parking, and conflictive movements, thereby hindering access by ambulances and other emergency vehicles), will continue and be exacerbated by the growth represented by the ACC and increased demand for medical care in general.

- Only minor and partial relief can be expected from the widening, realignment and possible two-way configuration of Parkman Street. Traffic approaching via Parkman would be that coming from the North Terminal area: Causeway Street, Staniford Street, William O'Connell Way; traffic approaching from Blossom Street would be a relatively minor flow. For east-west traffic on Cambridge Street emanating from Charles Circle and Government Center/ downtown, the main attraction will remain the N. Grove Street entrance.

- All drop-off traffic for ACC and White Building entrances is constrained to circulate through the White Building courtyard continuing the mix of employee, patient, ambulance, and taxi traffic therein, with potential for continued and increased congestion and conflict in the confined area.

- Fruit Street's present 20-foot width is constrained by MEEI, MGH, and Suffolk County Jail structures. Illegal parking effectively limits the street to one moving lane, one-way outbound from N. Grove to Charles Street. Therefore, the widening of Fruit Street and making it two-way to match a relocated and widened Parkman Street cannot be realistically contemplated at this time due to uncertainty over future building plans for the MGH and Suffolk County Jail sites bordering Fruit Street.

- Relocation of Parkman Street at an angle as proposed in the Context Plan and Certificate of Need alternative (Scheme B1):

  -- Creates triangular "remainder parcels" in the 4/B Block and possibly the garage and Bulfinch lawn blocks that may not be buildable due to awkward building shapes and the possible necessity to continue in use various utility lines below the present Parkman alignment

  -- Generates the necessity for taking up a relatively large proportion of the ACC's ground floor for the relocated street and extended connector to the entrance to the parking garage. (This is true of all schemes to a varying degree.)

-- Complicates auto turning movements due to the acute angles created at N. Anderson, Blossom, and N. Grove streets and the parking garage entrance.

- Added volumes are attracted into the MGH complex that are extraneous - i.e., have no relationship to the MGH/MEEI functioning. Could include traffic short-cutting from Blossom and Cambridge streets to Charles Street, to save distance or avoid the Charles Circle bottleneck. Such extraneous traffic traveling at high speeds and in large volume adds to the accident hazard, congestion potential, and air pollution problems within the MGH complex.

- No incentive to forsake the N. Grove Street for the Blossom/Parkman Street entrance since the Parkman Garage would be accessible from both sides. Some traffic at present will continue to appear on N. Grove with the same problems - e.g., illegal parking, double parking, congestion. The opportunity to balance traffic volumes and sort out traffic by function would be lost.

- Makes desirable that the main entrance to ACC face the White Building courtyard, inasmuch as a main entrance under the building off Parkman would be accessible for right-side (passenger door) drop-off only by entering Parkman Street and performing a U-turn across traffic flowing from Blossom. The alternative would be the creation of two major entrances.

- Use of the Fruit Street garage would continue to be predominantly for patient and visitor parking due to greater drop-off convenience of White Building courtyard and the psychological inclination to turn left. This could be somewhat offset by a pedestrian bridge or other direct and protected walkway from the Parkman Street garage to the ACC.

<u>Mitigating Measures</u>: Scheme B could be implemented with the following measures.

- Utilize all of the "no build" measures.

- Install directional signs on Cambridge Street routing the ACC and visitor parking to Parkman Street via Blossom.

- Restrict the use of Parkman Street garage to ACC patients, campus visitors, and general parking users.

- Internally restructure the parking program to permit employee parking only in the Fruit Street garage. Estimates indicate that non-employee total campus parking requires approximately 764 spaces in the peak demand period. If all of the 600 spaces in the Parkman Street garage and 150-175 spaces of the 750 in the Fruit Street garage were reserved for patients and visitors, the transient demand could be satisfied on campus. This would leave approximately 575-600 spaces available daily on campus in the Fruit Street garage for employee use.

<u>Scheme C: Parkman Cul-de-Sac</u>

<u>Features</u>: Scheme C also looks to the implementation of the ACC for the chance to rearrange circulation in and around MGH for greater efficiency and fewer conflicts. The scheme addresses three main issues: (1) reduction in Cambridge Street congestion; (2) conflict in traffic modes and functions, congestion, and illegal parking along N. Grove Street and in the White Building courtyard; and (3) underutilization of Blossom Street.

The main features of the scheme, as shown, are as follows.

- Parkman Street made two-way and widened on the north by two additional lanes (for a total of four moving lanes) with a recessed cab stand parking bay. The lanes would be separated by a landscaped median.

- A cul-de-sac terminating Parkman Street in a vehicular turn-around plaza underneath a portion of the ACC.

- The proposed cul-de-sac would have a weather protected drop-off bay on the north side adjacent to a lobby with elevators and stairways. On the south side would be access to the existing garage. A solid wall at the head of the cul-de-sac would prohibit access to North Grove Street. (The wall might be so constructed as to be removable in case that access option was ever desired.)

- The lanes in the parking bay would be separated by a pedestrian island median. Pedestrian access from the parking garage and its elevator would be furnished via a sidewalk around the head of the cul-de-sac avoiding pedestrian/vehicle conflict. Upper story connections to the ACC are also possible and desirable.

- Widening of N. Anderson Street to accommodate one moving lane of traffic in both directions would be desirable under this scheme due to the greater number of access/egress options and the avoidance of a signalized intersection at Blossom and Cambridge streets for a portion of the traffic.

- The existing parking garage on Parkman Street is proposed largely for handling the short-term parking generated by outpatients and visitors. The Fruit Street garage would then be predominantly available to long-term parking by hospital employees.

- Pedestrian crosswalks are proposed at the intersection of Parkman and N. Anderson streets, the medians providing a safety island midway. It is proposed that the crosswalks terminate in a pedestrian plaza adjacent and accessible to the ACC elevator lobby. The cab stand and drop-off bays would be discontinuous at this point to discourage standing cars from blocking pedestrian access. The plaza would be the focus of a system of walkways crossing the Bulfinch Building lawn, relandscaped after removal of the temporary buildings presently there.

A variant of this scheme (C2) that emerged from the design of measures to minimize harm rotates the long axis of the turnaround circle 90° such that this axis is parallel to the long axis of the ACC plan envelope. This allows for locating the lobby space between the Parkman Street cul-de-sac and North Grove Street; thus allowing greater length for the turnaround and drop-off lanes, if necessary.

Advantages: Scheme C appears to have the following advantages.

- Provides functional separation of traffic and balancing of volumes between Parkman and N. Grove streets. Parkman Street would handle outpatient ACC traffic, taxi cabs, and business and inpatient visitors arriving by automobile. N. Grove Street would be predominantly reserved for ambulance, service, employee, and MEEI drop-off traffic. Appropriate signing at N. Grove Street (e.g., "Emergency/Service Entrance Only") and at Parkman Street (e.g., "Outpatient/Visitor Entrance and Parking") would reinforce the functional separation. Relieved of the burden of handling the major share of outpatient and visitor traffic, there would be less likelihood of ambulances being obstructed on N. Grove by congestion or by illegally parked cars.

  Tables VII-1 and VII-2 illustrate the effect of this scheme on Parkman, N. Grove, and Blossom streets, and its incentive to alter traffic patterns. From a reading of Table VII-1, it is clear that the effect of the Parkman Cul-de-Sac is to balance the traffic on these three critical streets, and to decrease the chances that any one street will become intolerably congested. This same effect is shown qualitatively in Table VII-2, in terms of level of service.

- Discourages extraneous (non-hospital-bound) traffic from using Parkman/Fruit Streets as a shortcut between Blossom and Charles streets.

- Would provide better access to hotel proposed for Parcel 4/B and to the proposed entrance on Parkman Street. Cab stand could service both ACC and hotel, since both would be visible and audible for hailing.

- Assures passenger-side drop-off for patients/visitors arriving by automobile. Drop-off under building avoids inclement weather conditions.

- Diverts traffic from congested Cambridge Street to underutilized Blossom Street.

TABLE VII-1
DAILY TRAFFIC CHARACTERISTICS UNDER TWO BUILD SCHEMES

| | Certificate of Need | | | Parkman Cul-de-Sac | | |
|---|---|---|---|---|---|---|
| Street | Volume | Capacity | Vol/Cap Ratio | Volume | Capacity | Vol/Cap Ratio |
| North Grove | 7,500 | 12,000 | 0.62 | 3,000 | 12,000 | 0.25 |
| Parkman | 1,000 | 15,000 | 0.06 | 5,500 | 15,000 | 0.34 |
| Blossom | 7,700 | 28,000 | 0.28 | 13,200 | 28,000 | 0.45 |

TABLE VII-2
LEVEL OF SERVICE UNDER TWO BUILD SCHEMES

| Intersection | Certificate of Need | Parkman Cul-de-Sac |
|---|---|---|
| Blossom & Parkman | A | A - B |
| Cambridge & N. Grove | D - E (C possible) | C - D (C possible) |
| Cambridge & Blossom | D (C possible) | D - E (C possible) |

- Creates symbolic and aesthetic visual impact of a new "main entrance" for MGH through the combination of vistas of Bulfinch Building, its dome and lawn, the facade of the new ACC, and possibly that of the hotel proposed for Parcel 4/B.

- Avoids relocating or discontinuing utilities under Parkman Street.

Disadvantages: The disadvantages of Scheme C appear to be as follows.

- Reduces flexibility in choice of parking garage.

- Negates a cross-campus connection between Blossom and Charles streets via Parkman-Fruit streets.

- Reduces number of potential access routes for fire equipment (although leaving two routes open to each side of the ACC: west access routes, N. Grove and Fruit; east access routes, N. Anderson and Parkman).

- Shifts "main entrance" focus of MGH from White Building courtyard to Parkman Street, generating possible confusion for first-time visitors and for those accustomed to the existing circulation pattern. (Directional signals and establishment of new pattern would ameliorate confusion somewhat.)

Mitigating Measures: Scheme C could be implemented by taking the following measures.

- Utilize all of the measures included in the Scheme A and Scheme B options.

- Restrict N. Grove Street to emergency, service and employee use (for parking only).

- Install a semi-activated traffic signal at the intersection of Blossom and Parkman streets to insure safe, controlled vehicle movement.

## PARKING

### Performance Criteria

See p. D-11, response (22).

This section describes the performance criteria that have been developed for parking and some examples of what could be done to alleviate existing and anticipated parking problems. Many of the criteria described in the previous section on circulation also apply to parking but are not repeated here.

- Discourage illegal parking and standing on emergency access routes by strict enforcement of tow zone restrictions, functional separation and removal of taxi stands from such access routes.

- Explore further the utilization of off-campus parking lots serviced by an expanded shuttle bus system. If the North Station lot becomes available, it is imperative other off-site lots be found. Efforts should be made to overcome the legal problems with the Science Museum Garage and an exhaustive search should be instituted for other off-site areas.

- Restrict the use of Parkman Street garage to ACC patients, campus visitors, and general parkers.

- Internally restructure the parking program to permit employee parking only in the Fruit Street garage. Independent of pricing structure or demand, employee spaces should be limited to no more than 600 (500 preferable) on site within the garages. Pricing of these spaces should reflect the difference between the revenue produced by the high turnover transient parkers and that required to amortize successfully the costs of the garages and cover operating and fixed direct expenses. The remaining 750 to 850 spaces should be reserved daily for patients and visitors. The deficit in employee space demand would tend to forceably shift mode usage if no suitable alternative employee spaces could be found.

- Utilize commercial parking in adjoining areas, for example, Charles River Park and Charles River Plaza.

- Prohibit day employees from moving their automobiles from the North Station lot until at least 4 o'clock in the afternoon.

- Explore the possibility of instituting a valet parking service in the North Station lot to increase capacity.

- Encourage the diversion of parking demand to transit or to higher occupancy vehicles such as car pools or van pools. Carpooling opportunities could be centralized by matching trip origins and destinations through the payroll or some other central section.

## Examples

### Replacement of Lost Parking

MGH presently controls three parking garages and a large lot on Nashua Street. Their capacities are:

| | |
|---|---|
| Parkman Street Garage | 600 cars |
| Fruit Street Garage | 750 cars |
| Charles/Cambridge and Charles Street Garages | 250 cars |
| North Station lot | 800 cars |
| Total | 2,400 cars |

As a result of other CSCDC plans, the Cambridge Street garage on parcel 4A will be converted to housing, eliminating 170 parking spaces, and the North Station lot on Nashua Street could be lost if a proposed swap of that site for the Charles Street Jail were to take place.

The present City of Boston moratorium on new parking space permits a one-for-one replacement of parking where spaces are lost. No new spaces may be added, however. Thus the redevelopment of the jail site by MGH would allow some if not all the parking lost from Nashua Street to be recaptured in a more convenient location. Its added expense as garage parking would be partially offset by the disappearance of the need and cost to operate a shuttle service.

If the parking cannot be immediately or eventually replaced, measures to provide additional parking or offset the losses would be required. To cope with this problem, MGH may wish to consider a variety of strategies singly or in combination. They include:

- diversion of parking demand

- increase parking at remote locations

- use nearby commercial parking

**Diversion of Parking Demand to Transit or Carpools**

Such inducements as the MBTA Pre-Paid Pass Program and preferential garage rates or spaces for carpoolers and an in-house trip matching program would help divert parking demand. Added impetus could come from increases in parking rates and parking scarcity generated by non-replacement of any phased-out parking.

Vanpools, a concept proven successful by the 3M Corporation in Minneapolis, would involve the purchase of vans by the hospital which would be driven by an employee who rides free, and paid for by the van poolers who are charged a monthly fee. The fee would pay for both amortization and operation of the van. The fee is inevitably less than the cost to operate an individual's car in commuting. This economy, plus door to door travel and preferential parking, makes vanpooling quite popular among 3M employees. The vans can be used as shuttles during the day or for business trips around town thereby obviating the need for a motor pool or additional shuttle buses. Implementation depends on matching sufficient number of persons who live in the same area and have similar working hours.

**Increase Parking at Remote Locations**

Alternative parking locations in the vicinity of the MGH are scarce. However, the off-site locations need not be scarce, but could consist of a combination of smaller scattered lots serviced by an expanded shuttle bus scheme. A few locations are possibilities which should be explored:

- The lot in the North Terminal yards just south of the Gilmore Bridge owned by the Museum of Science and previously used by MGH.
- Other Museum of Science parking areas along O'Brien Highway.
- Areas between New Rutherford Avenue and the I-93 viaduct and under the I-93 - I-95 interchange viaducts near City Square in Charlestown. These unpaved areas would require improvement for use. A portion of them has been designated for Bunker Hill Community College parking. There is some community resistance in Charlestown to parking areas adjacent to City Square. If these issues can be resolved, this area might be an interim or long-term solution.

All the above areas would require service by expanded shuttle bus service, even if the costs of bus operation would need to be subsidized from other revenue sources.

**Use Nearby Commercial Parking**

Quite a bit of commercial parking presently exists in Charles River Plaza (812 spaces) and Charles River Park (1,221 spaces). A new 800 space parking garage is under construction on Lomasney Way and additional parking is being built under the high rise buildings being constructed. The amount of parking available at present is used nearly to capacity by tenants, shoppers and commuters to MGH and other area employment centers, but the parking under construction will provide some surplus. Shortages of MGH parking could be partially offset by use of these alternatives, albeit at higher commercial rates. The hospital could arrange subsidies if it saw fit.

The commercial parking is within walking distance and should require no shuttle service.

## TRUCK SERVICE

### Introduction

Construction of the ACC and removal of temporary buildings from the Bulfinch Building lawn will relocate the dumpsters now there for collection of MGH rubbish. The Hospital is exploring several locations on campus for a site for waste removal. One possibility is to utilize the present receiving dock in the Jackson Tower as a waste area, and in exchange combine receiving with the ACC. If the receiving is to be combined with the ACC, then the following two schemes are possible:

Truck Scheme 1: Subsurface Tunnel: N. Grove and Blossom streets.

Truck Scheme 2: Surface Entrance - White Building courtyard.

Features, advantages, and disadvantages of the two schemes may be described as follows.

### Truck Scheme 1: Subsurface Tunnel - N. Grove and Blossom Streets

This scheme (illustrated in Figure VII-5, page VII-17, Scheme C2) proposes a two-lane tunnel with a 10 percent grade extending from Blossom Street, in parallel with and just north of widened Parkman Street, to a subterranean truck loading bay beneath the ACC. An alternative location for the tunnel would be off of and in parallel with N. Grove Street on its easterly side. The tunnel, in this instance, would be located in the present green area between the sidewalk and the Parkman Street parking garage. It likewise would connect to a subterranean loading bay beneath the ACC. Dimensions of the bay in both options would be approximately 95 by 100 feet. Ramps and tunnels would be 20 feet wide. The N. Grove Street ramp would begin approximately 100 feet north of the N. Grove Street-Cambridge Street intersection. The truck bay would presumably connect directly to central supply rooms on the same basement floor.

Advantages: Scheme 1 appears to have the following advantages.

- Avoids mixing truck and auto traffic on Parkman Street approach.
- Permits all-on-one-floor off loading and storage for ease of goods movement.

- Avoids truck circulation and noise from approaching too near hospital where there is potential for disturbing patients.

Disadvantages: Scheme 1 disadvantages appear to be as follows

- Preempts existing or proposed green space along Blossom Street or in the Bulfinch Building lawn.

- Places a ramp depression in the foreground of the Bulfinch Building lawn - an aesthetic problem.

- Interferes with pedestrian sidewalk approaches from Blossom or Cambridge streets.

- Incurs added construction expense for tunneling.

- Noise of trucks pulling grade to Blossom Street could disturb adjacent nurses' residence (Bartlett Hall), assuming that use continues.

- Uses valuable interior space for truck turn-around maneuvers to exit unless designed as a separate project.

- Potential sight-line and turning movement conflicts for trucks exiting from Parkman Street ramp. Bartlett Hall may form a blind corner. Exiting trucks cross movement of vehicles turning right to Parkman Street.

- Subterranean truck bay could require venting of exhaust fumes.

Truck Scheme 2: Surface Entrance, White Building Courtyard

This scheme (illustrated in Figure VII-4, page VII-16) proposes a truck bay and entrance off the White Building courtyard into the ground floor of the ACC through mechanically operated roll-up-doors. The landscaped island proposed for the center of the White Building courtyard would be shortened to accommodate the swing of trucks maneuvering to back into truck bay. Central supply storage could be located adjacent to truck loading docks for direct transfer of cargo, or located in basement with supplies transferred from ground floor by conveyor belt or rollers, monorail, hydraulic lift, elevators, or some combination.

Advantages: Scheme 2 appears to have the following advantages.

- Utilizes existing surface roadway.

- Functionally separates traffic types and purposes by directing truck service traffic to N. Grove Street along with ambulances and employee auto traffic. Avoids mixing these functions with patient/visitor auto traffic in Scheme C, the Parkman Cul-de-Sac Scheme. With functional separation, volumes are balanced and reduced, thereby allowing freer flow of service vehicles.

Disadvantages: Scheme 2 has the following disadvantages.

- Places truck bay on ground floor with the necessity of transferring cargo between floors if supply storage is placed on basement floor.

- Causes trucks to enter the White Building courtyard with potential for noise distrubance to patients' rooms.

- Potential for truck interference with ambulance access, though random arrival times should overcome much of this potential.

- Would add to conflicts and congestion on N. Grove Street if used in conjunction with Scheme B. Works best with Scheme C.

- Interferes with pedestrians coming to clinics from transit (36 percent), and all pedestrians coming to White Building.

- Creates "back door" effect in White Building courtyard, even though the courtyard may continue to be a major entrance.

## PEDESTRIAN CIRCULATION

### Criterion

A system of pedestrian circulation should be provided which permits direct pedestrian access from the MBTA and other nearby locations to the ACC without unnecessary exposure to inclement weather, grade changes, and hazards of vehicular conflict.

### Examples

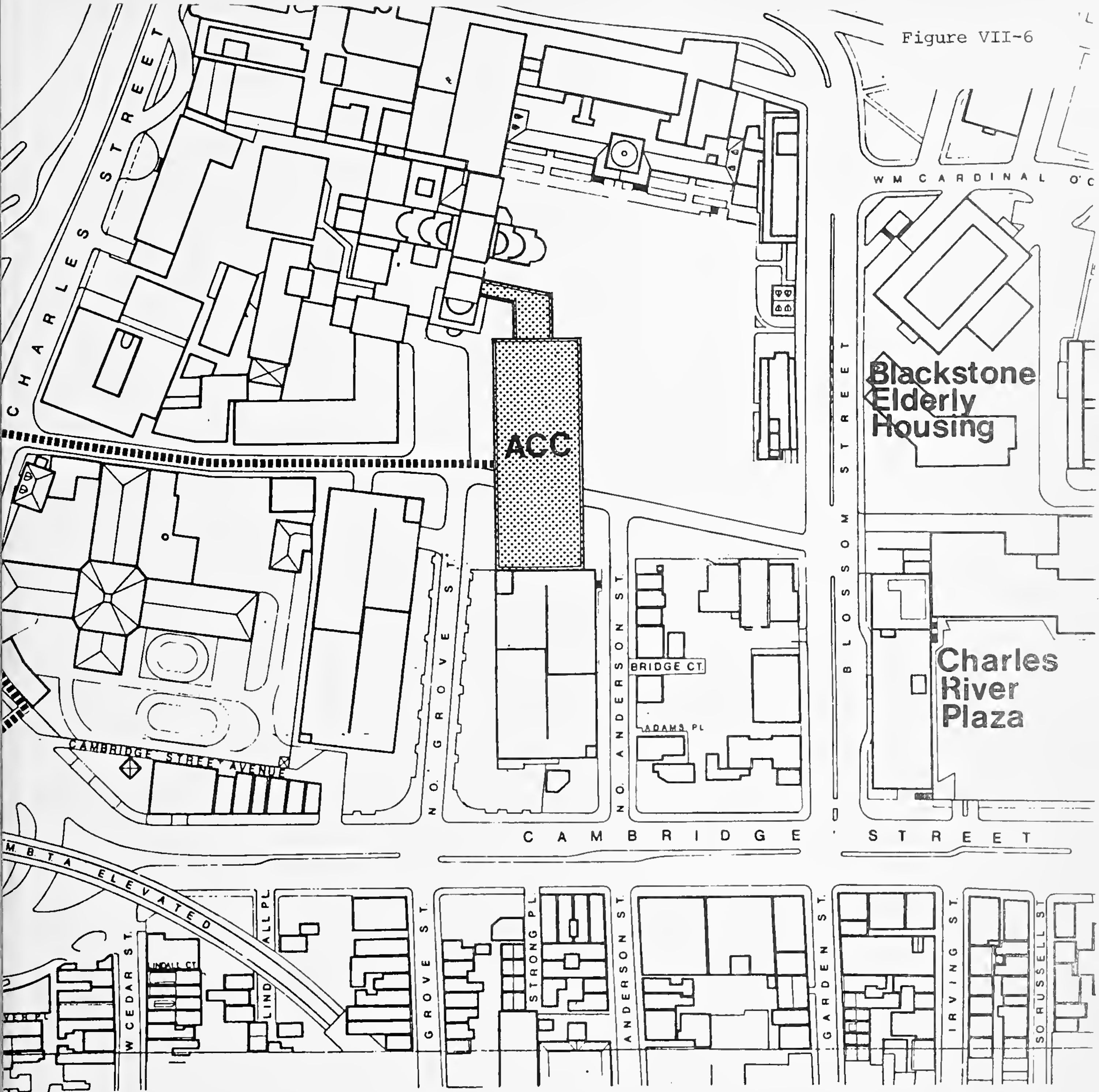
Most of the problems of present pedestrian access can be addressed by grade separated walkways or "skybridges". Existing levels and grades and future plans for adjoining tracts suggest second-level pedestrian walkways that would tie together the major land uses in the vicinity that have functional relationships to each other.

The main advantages of skybridges are that they separate pedestrians completely from vehicular traffic and, if so designed, can protect them from unpleasant weather. The main disadvantages of skybridges are: the lack of aesthetic appearance (which can be partially ameliorated by design); obstruction of light; construction and upkeep cost with assignment of responsibility; and possible security problems at building entrances and along the skybridge walks (which could possibly be ameliorated by adequate lighting, volume of users, remote television, police patrol, and manned reception areas in buildings).

One route for the skybridge would be via Charles and Fruit streets. This 980-foot-long connection could provide additional connections to MEEI, the Clinics Building, and the Fruit Street Garage, but would entail right-of-way and structural problems associated with constrained space and restriction of light and views for adjacent buildings and the street below.

Ideally, should a skybridge be constructed, it would be enclosed by an arched clear plexiglass ceiling for weather protection, and daylight illumination and visibility would thereby be provided as a measure to promote safety and prevent crime. The stairways between the change booth lobby and train platform level in the Charles Station, if provided with ramps and/or escalators, would facilitate use of the transit system by handicapped MGH outpatients with mobility problems, including possibly those in wheel chairs. (This could require that modifications be made at other MBTA stations in the transit systems as well.)

Figure VII-6




# Ambulatory Care Center
## Environmental Impact Report

Prepared for
**Massachusetts General Hospital**
**C.S.C.D.C.**
**Massachusetts D.P.H.**

Prepared by
Resource Planning Associates, Inc.
In association with
Wallace, Floyd, Ellenzweig, Moore, Inc.
Alan M. Voorhees and Associates, Inc.

## PEDESTRIAN CIRCULATION

▪▪▪▪▪▪ Skybridge

0 40 80 160 340 FEET

FEBRUARY 1975

Federal requirements and capital funding programs have been moving toward providing greater transit access for the elderly and handicapped. An early action program would appear well justified at this station, due to its obvious relationship to MGH.

Other Aids to Pedestrian Circulation and Safety: The following measures would assist pedestrians as they travel into and around the MGH campus.

- An adequate network of sidewalks crossing the Bulfinch Building lawn
- Implementation of pedestrian signalization built into the Cambridge Street traffic signal system
- Widening of Fruit, Parkman, and N. Anderson streets to accommodate wider sidewalks, as well as added traffic lanes
- Inclusion of more direct pedestrian connections between Charles Circle and MGH, if the Suffolk County Jail site is redeveloped
- Reduction in the number of gasoline service stations and/or the associated curb cuts
- Adequately signed, striped, and where needed, signalized crosswalks in whichever traffic circulation scheme is implemented.

## TRANSIT ACCESSIBILITY AND USE

**Criterion**

The MGH should improve the physical access from the Charles Street MBTA station and provide transit use incentives and parking disincentives that are strong enough to cause a significant shift from auto to transit usage. While difficult to measure, such a shift should cause the present 23 percent rate of transit usage to MGH to more closely approximate the average level of transit usage for all downtown trips, or about 45 percent.

**Examples**

Physical Access from Charles Station: An enclosed skybridge that would extend from the Charles station's platform levels to the MGH, or more specifically to the lobby of the ACC, would effectively reduce the problems of physical access previously described (i.e., negotiation of multiple staircases and lack of weather protection). Alternative routes for such a skybridge are presented in the foregoing section of Chapter VI which discusses pedestrian circulation.

Employee Transit Use: Employee use of the MBTA system could be encouraged by using a "carrot and stick" approach. The "carrot" might consist of MGH providing to its employees the option to join the MBTA Pre-Paid Pass Program. Under this program, an employee of a participating firm or institution can purchase a pre-paid annual transit pass by a payroll deducation arranged through the payroll department. Passes are available in three denominations according the most typical commuting uses of the MBTA. By providing unlimited rides, (though based on the typical number of commuter trips per year) the passes can save employees $25.00 or more per year. Employees also save time, as there is no need to stand in lines to get the exact change, or to be concerned about commuting money. The cardholder simply shows his pass at the station gate and can then board promptly.

The "stick" aspect of the "carrot and stick" approach may be the outcome of events that would make automobile travel more expensive, and parking scarcer and more highly priced. Rising prices for automobiles and gasoline may shift some people to transit for budgetary reasons. Parcel 4A redevelopment and a possible swap of the Charles Street Jail site for the North Station parking lot could reduce the amount of MGH parking available and encourage a shift to transit use or perhaps car pools. (See Chapter VII topic on parking, for additional car pools discussion.)

slopes downwards toward the south. Figure VI-9 indicates the elevation of the top of the natural inorganic soil (the Boston Blue Clay) with reference to the BCB.

Groundwater conditions of the site have not been studied in detail, but records at MGH indicate that mean groundwater levels are approximately +8 BCB, or approximately 8 to 10 feet below the ground surface. Yearly variations of about 4 feet mean that groundwater may rise to a seasonal high-water table of approximately 4 to 6 feet below ground surface. MGH buildings in the area have water-proofed basements, but have occasionally had seepage problems that have required increasing the amount of water-proofing.

Foundations of Existing Buildings

Due to the existence of organic soils on and around the ACC proposed site, many of the MGH buildings are founded on piers or piles bearing on the stronger underlying deposits. The following table, based primarily on construction drawings available at MGH, summarizes foundation conditions for buildings in the area.

TABLE VI-14
MGH BUILDING FOUNDATIONS
AND BEARING MATERIALS

| Building | Foundation Type | Probable Bearing Material |
|---|---|---|
| White | Step-taper piles and caissons | Glacial Till |
| Moseley | Wood Piles | Clay |
| Walcott | Wood Piles | Clay (?) |
| Clinics | Wood Piles | Clay |
| Garage A | Caissons | Clay |
| Garage B | Spread Footings or Caissons | Clay |
| Bartlett Hall | Spread Footings | Clay |
| Bulfinch | Spread Footings | Clay |

## RELOCATION OF SUPPORT FACILITIES

### Solid Waste Disposal

#### Criteria

As the following criteria apply, a new location for the waste handling facility should be:

- Accessible to trucks for servicing
- Hidden from view
- Outdoors and separated from other shipping and receiving functions due to considerations of odor and sanitation.

Three alternative locations meet all or most of the above criteria: Jackson Tower/Blossom Street, Phillips-Vincent-Burnham Courtyard and the proposed Ambulatory Care Center.

#### Examples

Jackson Tower/Blossom Street: Availability of this entrance would assume the transfer of central service and supply functions to the ACC. If that appears desirable and feasible then this entrance could reasonably be assigned a waste disposal function. It has the disadvantage of being a confined space which could possibly accumulate objectionable odors that could affect adjoining work areas.

Phillips/Vincent-Burnham Courtyard: This location appears ideal from the standpoint of access, available space, concealment, and ability to keep the dumpsters outdoors, especially if even more space is made available by the removal of the Rehabilitation Clinic Building as has been discussed. Placing the dumpsters here would not necessarily negate keeping the existing receiving function. The main drawbacks of this location are that the dumpsters would be visible from surrounding buildings (especially from Phillips House) and that there would be noise during the times the dumpsters are serviced. However, this option avoids both using valuable internal space for rubbish dumpster storage and truck bays, and potential odor problems. The compacting equipment could be installed in the Rehabilitation Clinic, in a new building, replacing the clinic, or in a portion of the Vincent-Burnham Building which will be available if its uses are transferred to the ACC.

Ambulatory Care Center: If a central service/supply function is not established in the ACC, then the same schemes that were developed for a receiving function in the ACC would be available for storing and servicing dumpsters. (See this chapter's section entitled "Truck Service".) Options incude ground floor or subterranean truck bays serviced by entrances off either Blossom or North Grove streets, or the White Building courtyard. Again, the disadvantage of this ACC scheme is that an internal waste storage area could create odors.

## Bicycle Storage

### Criteria

As the following criteria apply, a new location for the bicycle storage facility should be:

- Centrally located
- Visible to pedestrians and cyclists
- Secure from vandalism and theft
- Weather protected.

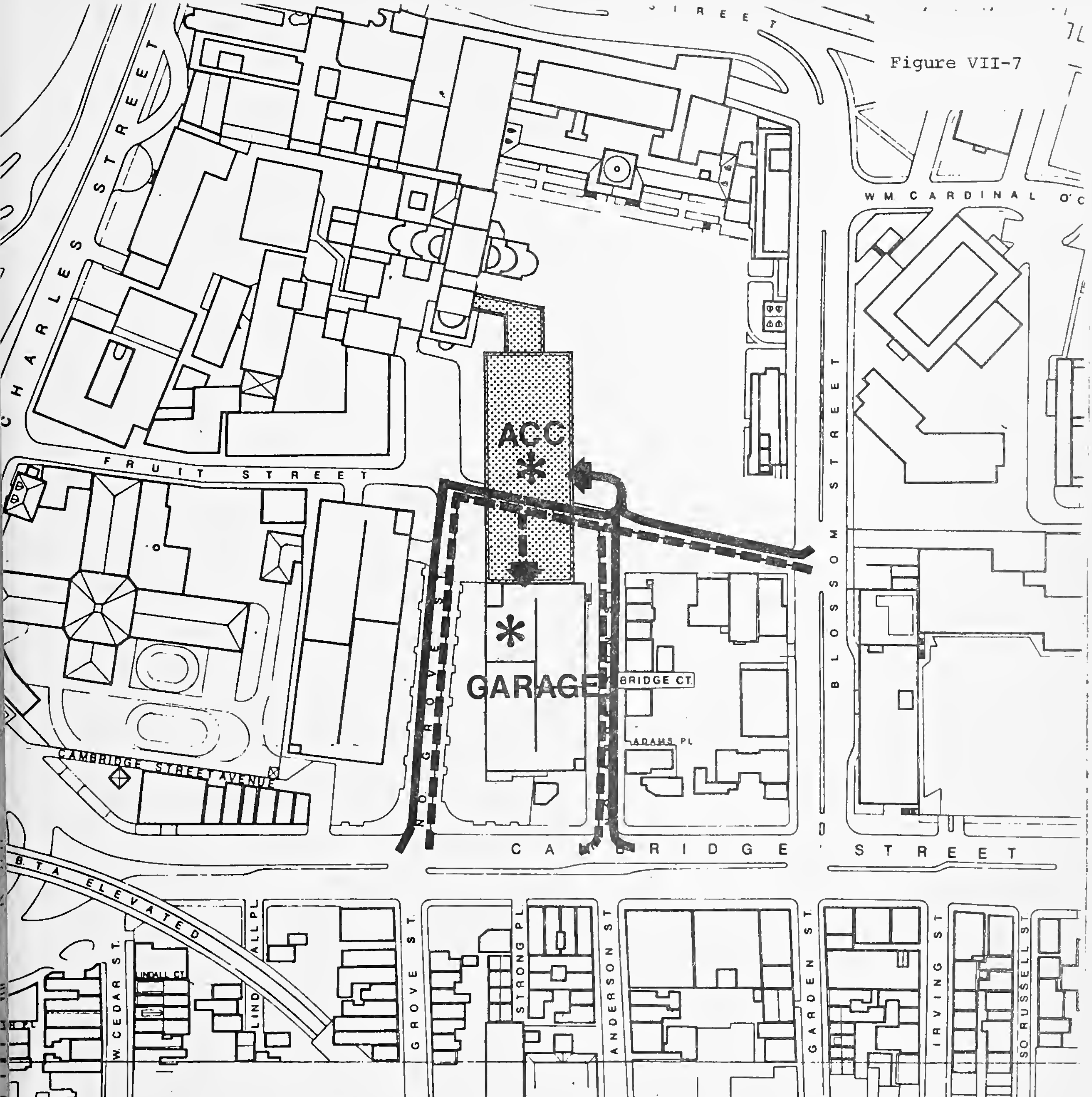
### Examples

Two alternative locations appear to meet the criteria for bicycle storage: a location on the ground floor of the proposed ACC, and a location at either the Fruit Street or the Parkman Street garage. (See Figure VII-7.)

ACC Ground Floor Location: A bicycle storage room could be designated on the ground floor with entrance off a pedestrian plaza on the Bulfinch lawn side of the ACC. The entrance would face Blossom Street and be approached via Parkman or North Anderson streets. In the cul-de-sac traffic circulation scheme (B2), an automatic door from Grove Street to the vehicular plaza under the ACC would allow cyclists to walk bikes through the plaza to the storage room. The room and entrance could, alternatively, be oriented to the White Building courtyard.

An interior storage room offers security and weather protection for bicycles. A modest space-rental fee (e.g., monthly pass for employees, check stub for visitors) would support the cost of the facility and would also allow for an attendant to add further security. Racks or lockers could be provided to permit locking of bikes. A concrete "mud room" floor would allow

Figure VII-7

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## BICYCLE STORAGE FACILITY LOCATIONS

* Alternative Locations

Entry Point and Approach Paths

0 40 80 160 340 FEET

FEBRUARY 1975

wet bicycles to drain into catch basins in the floor and permit clean-up by hosing down. Rain-dampened riders could shake off water before entering corridors or lobbies.

This accommodation of the bicycle mode would encourage its wider use by those able to do so, thereby reducing auto traffic, congestion, and air pollution in the vicinity of the hospital, even if only to a small degree initially.

Fruit or Parkman Street Garage: A second and perhaps less expensive alternative would be to create a bicycle storage area in one or both of the existing parking garages. Again, fees could be charged to offset the expense of maintaining such an area, with security and ticket selling functions being handled by the existing attendants in the same manner as for automobiles. Placing the facility on the ground floor would increase convenience and safety and add to security by its visibility from the booths.

While there is a potential that more conflicts with automobiles may occur in this scheme, bicycle-pedestrian conflicts would be fewer than in the ACC scheme discussed above. The bicycle storage areas in either location would enjoy the centrality and accessibility advantages of the existing facility while improving on security and weather protection.

## Oxygen Tank

### Criteria

As the following criteria apply, the oxygen tank should be relocated so to be:

- Outdoors
- Accessible to trucks for service
- Not in conflict with surrounding landscape.

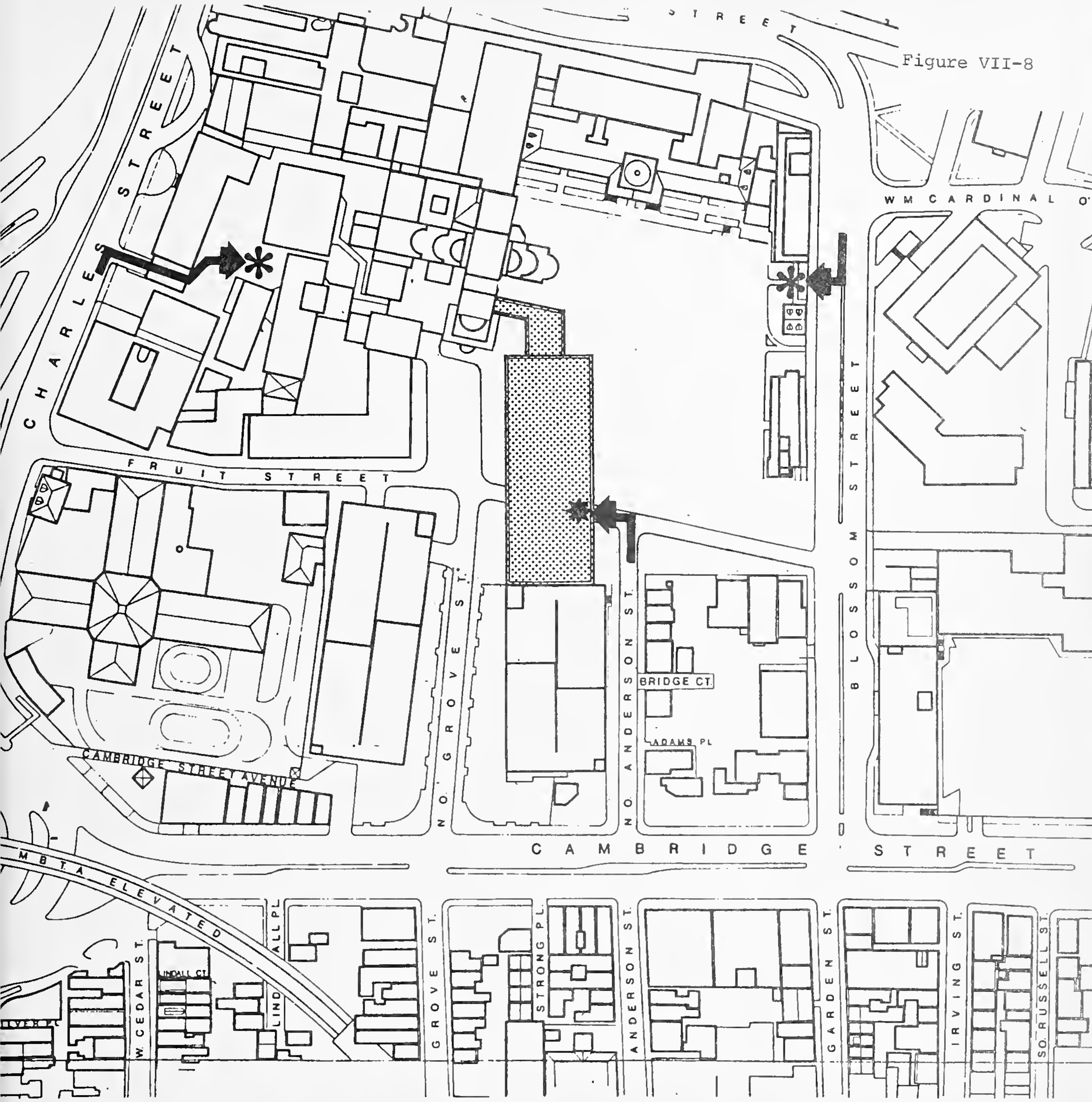
### Examples

Two locations appear to meet these criteria:

- Between the Resident Physicians' House and the Research Building off Blossom Street
- In the courtyard between Phillips House and Vincent-Burnham Building off Charles Street

These locations are shown in Figure VII-8.

Figure VII-8

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## OXYGEN TANK RELOCATION

- Present Location
- Proposed Relocation Sites
- Access Points and Routes

0 40 80 160 340 FEET

FEBRUARY 1975

Resident Physicians' House and Research Building: This alternative would use a portion of Bulfinch lawn lying between the Resident Physicians' House and the Research Building. Its implementation would require removal of the brick wall along the Blossom Street sidewalk, construction of a curb cut for truck entry, and fencing to reduce negative visual effects on the Bulfinch lawn. Security would also be required from the street. Trucks servicing the tank would extend part way into Blossom Street. Sidewalks now existing would require rerouting. The site is somewhat hampered by its distance from the main core of MGH, and thus more piping would be needed to distribute the oxygen.

Phillips/Vincent-Burnham Courtyard: In this alternative the oxygen tank would be located in the courtyard between Phillips House and Vincent-Burnham. Supply trucks would access the site via an entry off Charles Street. There appear to be no potential visual conflicts. The space is large enough to offer a number of alternative locations within the courtyard with room for expansion if necessary. Trucks would not interfere with pedestrian or vehicular circulation on Charles Street when servicing the building due to the interior location of the courtyard. This location is also close to the core of the MGH complex and little additional piping would be necessary.

## TRADE-OFFS AMONG CRITERIA

As indicated earlier, it is not always possible to simultaneously satisfy all of the environmental performance criteria perfectly, and trade-offs must be made among some of them. Shown on the following page is a matrix which displays the most significant interactions between the criteria. A summary of these tradeoffs follows.

These tradeoffs require judgments on the part of the Department of Public Health, the Massachusetts General Hospital, and the community about which criteria are most important. In a few cases where one impact is clearly more severe than another, this judgment has been made in the discussion that follows.

### Wind/Air Quality/View/ Shadows

Siting and design of the building, as discussed in Alternatives A1 and A2, could create air quality problems in the White Building courtyard and interfere with minor views from Charles River Park. Turning the building, as described in Alternates B and C, would alleviate the wind and air quality problems, but would block views of and increase shadows on the Bulfinch Building courtyard.

### Air Quality/Vehicular Circulation/Pedestrian Circulation

Air quality and circulation must be considered together to avoid high concentrations of pollutants where pedestrians walk or stand. However, many of the example solutions discussed in the earlier sections of this chapter avoid conflicts between these two criteria, and none of the proposed schemes pose difficult circulation problems.

### Vehicular Circulation/ Utilities

Attractive circulation schemes proposed here or developed subsequently by the architect could require relocation of City of Boston water and sewer lines. These two criteria should be considered together, although conflicts can clearly be avoided.

### Truck Service/Vehicular Circulation/Pedestrian Circulation/Views

Truck service, vehicular and pedestrian circulation should clearly be considered together to avoid conflicts between trucks, pedestrians, and automobiles.

The traffic circulation scheme, discussed above as Scheme B, solves the problem of vehicular conflict by separating trucks from automobiles. Trucks would use the same entrance as the ambulances, but the volumes of both are sufficiently low that conflict is not anticipated.

Relocating the truck service entrance to Blossom Street, as described in Scheme 1, would obscure somewhat the pedestrian level views of the Bulfinch Building and courtyard. Sites for the relocated waste handling facility and oxygen tank must be coordinated with truck service and circulation patterns.

**Parking/Vehicular Circulation/Pedestrian Circulation**

Obviously, all of the vehicular and pedestrian circulation schemes developed as part of this study, or which may be developed later by the architects, must provide easy access to the existing parking garages by pedestrians and vehicles. Both Scheme 1 and Scheme 2, as discussed above, accomplish this satisfactorily. In addition, relocation of employee parking off the site could alleviate congestion and facilitate circulation on campus.

**Pedestrian Circulation/ Transit Accessibility**

Pedestrian circulation scenes need to be developed which improve accessibility to the Charles Street MBTA station, as well as separate pedestrians from motor vehicles. The system of skybridges described in Chapter VII do satisfy the criteria for both transit accessibility and pedestrian circulation.

**Noise/Hydrology**

In foundation design, the major trade-off involved is between the need for driving piles, either for temporary lateral earth support or for the actual foundation, and the noise annoyance associated with such pile driving. Chapter VI discusses this issue in greater detail. Clearly, the need to avoid foundation damage is the paramount concern. If possible, this goal should be achieved without driving piles, through use of a concrete mat foundation and a temporary lateral support system consisting of a slurry wall. However, if design phase geotechnical studies rule out either or both of these options, the impact of pile-drive noise should be minimized through the use of the mitigation techniques discussed in Chapter VI.

TABLE VII-3
TRADE-OFFS AMONG CRITERIA

| Criteria | Air Quality | Noise | Wind | View | Shadows | Vehicular Circulation | Truck Service | Parking | Pedestrian Circulation | Transit Accessibility | Utilities | Hydrology | Relocation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Air Quality | | | ● | | | ● | | | ● | | | | |
| Noise | | | | | | | | | | | | ● | |
| Wind | ● | | | ● | ● | | | | ● | | | | |
| Views | | | ● | | | | ● | | | | | | |
| Shadows | | | ● | | | | | | | | | | |
| Vehicular Circulation | ● | | | | | | ● | ● | ● | | ● | | ● |
| Truck Service | | | | ● | | ● | | | | | | | ● |
| Parking | | | | | | ● | | | ● | | | | |
| Pedestrian Circulation | ● | | ● | | | ● | ● | ● | | ● | | | ● |
| Transit Accessibility | | | | | | | | | ● | | | | |
| Utilities | | | | | | ● | | | | | | | |
| Hydrology | | ● | | | | | | | | | | | |
| Relocation | | | | | | ● | ● | | ● | | | | |

# APPENDIX A

## LETTERS FROM THE COMMUNITY

RECEIVED

JAN 27 1975

WALLACE FLOYD ELLENZWEIG INC.

QUESTIONS ABOUT MGH ACC EIR

I. USEAGE

A) Verification of all data on projected useage supplied by Hospital to assure an accurate data base for all further analysis.

B) Estimates of projected useage capacities of the facility based on present staffing and on the maximum staffing which the proposed facility would permit (acknowledging that expansion of different services could produce different volumes of useages).

C) Relationship of useage data to hospital as a whole--that is projected useage volumes for any existing vacant space or space which becomes vacant due to relocation to ACC.

D) The study must relate to proposed changes now under discussion in the area such as final phases of current West End, Blackstone School, 4A, 4B & Jail sites, and to impact on MGH useage of potential closing of BCH.

E) Maximum tolerances of the area must be measured in terms of estimated impacts of various combinations of plausible new uses with comparisons to generally applicable maximum tolerances for sound urban planning, e.g., how many cars per hour can Cambridge Street tolerate and what is generally rated as a maximum for such a street under general planning concepts.

II. METHODOLOGY

Each aspect of EIR should contain a description of the methodology employed in procuring or evaluating data and in assessing impacts, the tests employed, the sources of data, who performed each item of work.

III. CONCLUSIONS

A) The report should contain conclusions by the consultant concerning the impacts positive, neutral, or adverse, and the degree of such impacts, and should also contain sufficient material to inform the readers how the consultant reached these conclusions and to enable the informed reader to make independent judgments.

B) As part of the judgmental phase, an evaluation must be made of the alleged positive impacts of the ACC as submitted by MGH; and the No-Build alternative should explain which, if any, positive impacts could be attained in existing space and why others cannot.

IV. IMPACTS

What are the various ranges of impacts on the following matters as to alternatives being studied:

A) Traffic and Parking--potentials for signalization solutions, solving chaos at White Building entrance, use of existing mini-buses from 3 T lines and existing garages, improving congestion due to Cambridge Street entrance to Shopping Center garage, relation to present and expanded Science Museum and to proposals for Leverett Circle, and an evaluation of user cost problems for parking facilities, i.e., at what point are parking charges and spaces sufficient so that users will not cruise local streets looking for legal (or illegal) parking spaces, but not so cheap as to encourage use of cars rather than public transportation. Potentials for requiring employees to utilize public transportation, and data on current employee transportation modes.

B) Law Enforcement--to what extent will this necessitate increased police, meter maid and city towing (of illegally parked cars) services; what relationship will the methadone clinic bear to the ACC?

C) Utilities--what impact on any overloaded facilities, in particular, additional natural gas does not seem to be available to Beacon Hill at present,and water pressure for fire fighting, etc., may be questionable in some upper portions of Beacon Hill; sanitary sewerage capacity.

D) In Process Construction--any pile driving, trucks carrying demolition and construction material via what routes; where will workmen congregate prior to starting time and at lunch breaks; what kind of noise control on various construction equipment and generators; asbestos contamination.

E) Resulting Uses--what other uses does this ACC generate and what secondary impacts do these ancillary uses have, e.g., new hotel, fast-foods, lodging houses, parking lots.

F) Economic--effect on existing businessmen, e.g., increased business profits or increased space demand with higher rent, more parking congestion, loss of office tenants due to personnel relocating to ACC.

G) Housing--what impact on neighborhood housing will demolition of existing nurses' dormitories have, increased staff, increased transient out-patients.

H) Relocation--what non-hospital residents or merchants must be relocated and how; what will become of current uses in demolished buildings.

I) Taxes--what is the impact on city taxes of the ACC.

J) Zoning--what zoning and other legal permissions are required.

K) Open Space--how will new facility affect existing, or create, open spaces; shadows and wind impacts.

L) Design--Visual perceptions from Beacon Hill, view of Bullfinch Building and related open space, height and material of building to blend with surroundings. Equipment, etc. on roof or adjacent land. EIR criteria for subsequent design stage; and criteria for architect selection.

M) Pollution--noise, air, trash--from increased vehicular and pedestrian useage and from ACC facility, trash disposal plans, radio and television interference, impact on Charles River of sewerage increase.

BB/jl

FEB 21 1975

JOSEPH F. CASAZZA
Commissioner
JOHN F. FLAHERTY
Deputy Commissioner

Telephone 722-4100
~~Ext. 700~~

CITY OF BOSTON

PUBLIC WORKS DEPARTMENT

ONE CITY HALL SQUARE

BOSTON, MASS. 02201

DIVISION ENGINEERS
John F. Flaherty, Sanitary
Frederick L. Garvin, Engineering
Charles M. Martell, Highway
John P. Sullivan, Water
Jamas A. O'Rourke, Sawer

February 18, 1975

Cambridge Street Community Development Corporation
Attention: Ms. Ester Maletz
Grey 12
Massachusetts General Hospital
Blossom Street
Boston, Mass. 02114

Dear Ms. Maletz:

In answer to a request by Resource Planning Association Inc., (see attached) regarding proposed ambulatory Care Center at Mass. General Hospital, I am forwarding to you copies of reports on availability of sanitary sewer, storm drain and water supply for the proposed project.

I call to your attention at this time that extensive negotiations with the city will be required on this project prior to any approval for construction being considered. These negotiations are required on this project because of your apparent intent to relocate or build over some of the city facilities in the area.

Very truly yours,

Joseph F. Casazza

Joseph F. Casazza
Commissioner of Public Works

JFC/FLG/JO'R/jl
Encl.

JAN 29 1975

BOSTON EDISON COMPANY
GENERAL OFFICES 800 BOYLSTON STREET
BOSTON, MASSACHUSETTS 02199

January 27, 1975

Cambridge Street Community Development Corporation
Grey Twelve
Mass. General Hospital
Blossom Street
Boston, MA 02114

Attention: Ms. Esther Maletz

Re: Proposed O.P.D. Building
MGH - Energy Supply

Dear Ms. Maletz:

In compliance with a request of Ms. Mary Chillingsworth of Research Planning Associates regarding an environmental impact study of the above referenced building, I am writing you for the purpose of assuring the availability of adequate electrical and district steam capacity from Boston Edison Company in supplying this proposed facility.

Specifically, we will be prepared by 1978 to supply the 1,140 kW peak electric demand at 13,800 volts and the 18,400 pounds per hour steam capacity requested.

We look forward to serving this new building, and if I may be of further service, please call me at 424-2304.

Sincerely,

Lawrence E. Tuck

Lawrence E. Tuck
Division Head
Steam Sales & Service Division

LET:jmb

JOSEPH F. CASAZZA
Commissioner
JOHN F. FLAHERTY
Deputy Commissioner
Telephone 722-4100
Ext. 700

CITY OF BOSTON
PUBLIC WORKS DEPARTMENT
ONE CITY HALL SQUARE
BOSTON, MASS. 02201

DIVISION ENGINEERS
John F. Flaherty, Sanitary
Frederick L. Garvin, Engineering
Charles M. Martell, Highway
John P. Sullivan, Water
James A. O'Rourke, Sewer

February 14, 1975

TO WHOM IT MAY CONCERN:

Re: Proposed Ambulatory Center at Massachusetts General Hospital

This is to certify that City of Boston sanitary sewer and surface drain facilities are available at the site of subject proposed project.

James A. O'Rourke
Division Engineer
Sewer Division

JAO/ljg
MJD

FEB 21 1975

JOSEPH F. CASAZZA
Commissioner
JOHN F. FLAHERTY
Deputy Commissioner
Telephone 722-4100
Ext. 700

CITY OF BOSTON

PUBLIC WORKS DEPARTMENT

ONE CITY HALL SQUARE

BOSTON, MASS. 02201

DIVISION ENGINEERS
John F. Flaherty, Sanitary
Frederick L. Garvin, Engineering
Charles M. Martell, Highway
John P. Sullivan, Water
James A. O'Rourke, Sewer

February 18, 1975

Cambridge Street Community Development Corporation
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Grey 12
Massachusetts General Hospital
Blossom Street
Boston, Mass. 02114

Dear Ms. Maletz:

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I call to your attention at this time that extensive negotiations with the city will be required on this project prior to any approval for construction being considered. These negotiations are required on this project because of your apparent intent to relocate or build over some of the city facilities in the area.

Very truly yours,

Joseph F. Casazza

Joseph F. Casazza
Commissioner of Public Works

JFC/FLG/JO'R/jl
Encl.

JOSEPH F. CASAZZA
Commissioner
JOHN F. FLAHERTY
Deputy Commissioner
Telephone 722-4100
Ext. 700

CITY OF BOSTON
PUBLIC WORKS DEPARTMENT
ONE CITY HALL SQUARE
BOSTON, MASS. 02201

DIVISION ENGINEERS
John F. Flaherty, Sanitary
Frederick L. Garvin, Engineering
Charles M. Martell, Highway
John P. Sullivan, Water
James A. O'Rourke, Sewer

February 14, 1975

TO WHOM IT MAY CONCERN:

RE: Proposed Ambulatory Care Center at Massachusetts General Hospital

Please be advised that there is potable water available at the above mentioned location.

This water supply meets potable requirements of the United States Public Health Service and will adequately serve the premises.

Very truly yours,

John P. Sullivan

John P. Sullivan
Division Engineer

JPS:PM:jc

# APPENDIX B

# NOISE MEASUREMENT TECHNIQUES

## NOISE MEASUREMENT TECHNIQUES

### AMBIENT NOISE LEVEL MEASUREMENTS

In order to evaluate the existing daytime ambient noise levels around the ACC site, sound level measurements were taken on January 14 and 15, 1975 at the locations shown in Figure V-2 and Table V-2 in the Chapter V discussion of noise levels in the environment, presented in the main text. Readings were taken with a "Precision" sound level meter (General Radio Type 1933), which conforms to the performance standards for sound level meters set by the American National Standards Institute (S.1.4 - 1971). Noise levels in decibels were taken on an "A-weighted" scale, with the meter set to slow response. Windspeeds were low.

The measurement procedure used is that recommended by the Federal Highway Administration.* For purposes of recording, the A-scale levels were grouped into intervals or "windows" of 2-decible width - that is, 60 to 62 dBA, 62 to 64 dBA, and so on. The continually varying sound level was sampled every 10 seconds and the reading was recorded on a data sheet. This statistical sampling approach was used to determine the following measures of ambient noise levels, defined in terms of the percentage of time a given sound level is exceeded:

- "$L_{10}$" noise level - that level in dBA exceeded 10 percent of the time (reflecting the influence of brief intrusive noise levels that are particularly annoying, such as nearby passage of vehicles).
- "$L_{50}$" noise level - that level exceeded 50 percent of the time (indicating average conditions).
- "$L_{90}$" noise level - that level exceeded 90 percent of the time (indicating the background noise level).

---

*Fundamentals and Abatement of Highway Traffic Noise: Textbook and Training Course, Federal Highway Administration, 1972.

After 50 measurements were taken at each location, a check was made to determine each of these noise levels and to determine whether the statistical criterion of validity was met by the sampling results. The $L_{10}$ was determined by finding the 1st, 5th and 10th loudest samples on the data sheet. The 5th loudest sample constitutes the $L_{10}$ noise level, flanked by its upper and lower error limit. If the results showed that these three test samples fall within 6 dBA, then it was determined that the $L_{10}$ measurement fulfills the statistical criterion that the $L_{10}$ level fall within the upper and lower error limits 95 percent of the time. A similar procedure was followed for the $L_{90}$ noise level with the 50th, 45th, and 40th loudest samples. If the statistical test was not met for the $L_{10}$ and $L_{90}$ noise levels, an additional 50 samples were taken at the location.

To make the sampling levels comparable with data available on the likely noise levels of construction, the field measurements were further analyzed to determine the "energy average" of L-equivalent ($L_{eq}$) noise level at each sampling location. The $L_{eq}$ noise level is defined mathematically as the mean-square sound-pressure level, a measure of the average energy of sound at the location. It thus takes into account the range of variation in sound level readings as well as the average level. A close approximation to the $L_{eq}$ can be quickly determined by the empirically-derived formula $L_{eq} - L_{50} + d2/60$ where $d = L_{10} - L_{90}$ (assuming the probability distribution of the A levels is reasonably in conformance with a Gaussian distribution).*

These calculations were performed for each sample location. In Table B-1, the $L_{10}$, $L_{50}$, $L_{90}$, and $L_{eq}$ noise levels are tabulated at each sample location.

## CONSTRUCTION NOISE LEVEL MODEL

The model used for prediction of construction noise levels, with and without noise control measures, is that developed as part of a report published by

---

*Noise and Vibration Control, Beranek, Leo, ed., McGraw-Hill Book Company, New York, 1971, p. 569. A Gaussian distribution is defined as a normal distribution.

the U.S. Environmental Protection Agency.* In this model, all construction operations were separated into five phases: clearing, excavating, foundations, erection, and finishing construction. Projects were classified according to the following four types:

- Domestic housing
- Nonresidential construction (e.g., office building, school, hospital, hotel)
- Industrial construction
- Public works (e.g., roads)

The average noise levels of all types of commonly used construction equipment were determined by data derived from actual measurements. For each phase and type of construction, a single "usage factor" (or decimal percentage) was determined for each piece of equipment that is the product of: 1) the percentage of construction sites at which each piece of equipment is used; 2) the estimated fraction of the phase duration for which the equipment is on site; and 3) the "duty cycle," or the fractional time that this equipment is operating while on site. Table B-2** indicates the equipment typically used in "nonresidential construction" (the category into which the ACC fits), and the average noise level and usage factors for each type of this equipment. These data were used in the EPA report to calculate the energy average noise level for each of the five phases of construction as shown in Table VI-26, presented in Chapter VI of the main text. Representative time variations of construction noise were modeled by dividing each of the five phases into fifty equal time intervals. The "usage factor" was taken as the fraction of time in which each piece of equipment was operating; i.e., with a usage factor of .4, a piece of equipment would be operating during

---

*Report NTID 300.1, Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances, prepared for U.S. Environmental Protection Agency, by Bolt, Beranek, and Newman, December 31, 1971.

**Source: EPA Report NTID 300.1, previously cited.

20 out of 50 time periods on the average. The start or "turn-on" times for each individual piece of equipment were determined by using a computer random number generator. By combining the noise levels for each piece of operating equipment, the total noise level in each time interval was then calculated; from this group of values the desired energy average was then determined.

## NOISE LEVELS WITH QUIETING TECHNIQUES

To determine the effect of equipment quieting techniques on overall construction noise levels, it was first necessary to determine how much each individual piece of equipment could be quieted. Table B-3* lists the immediate noise level reduction feasible for each piece of construction equipment using presently-available technology. It was felt, however, that these levels were somewhat optimistic. Therefore, for most pieces of equipment, only half the amount of noise reduction shown as possible in the EPA report was assumed to be achievable for the purposes of these calculations. For air compressors, generators, and pumps, however, information available from equipment manufacturers substantiated the reduction to 75 dBA indicated in the EPA report.

With the noise levels assumed for each piece of quieted equipment, the model previously described could then be used to calculate an average noise level for each phase of construction with equipment quieting. The usage factors shown in Table B-2 were held constant, thus assuming no change in the typical construction process itself. The turn-on times for each piece of equipment were generated by use of a random numbers table. The model was run only for the excavation and finishing stages, which are the noisiest and hence most irritating construction phases. It is felt that the results of the model represent a fairly conservative estimate of the possible levels of quieting, due to the limited quieting potential assumed for each piece of equipment.

---

*Source: EPA report cited previously.

TABLE B-1
MEASURED AMBIENT NOISE LEVELS
(in dBA)

| Point No. | Location | $L_{90}$ | $L_{50}$ | $L_{10}$ | $L_{eq}$ |
|---|---|---|---|---|---|
| 1 | White Bldg. inside main lobby | 61 | 65 | 67 | 66 |
| 2 | White Bldg. fifth floor patient bedroom | 45 | 53 | 59 | 56 |
| 3 | Clinics Bldg. Ambulatory Screening Clinic | 55 | 61 | 67 | 63 |
| 4 | Outside White Bldg. main entrance | 65 (61) | 69 (63) | 73 (75) | 70 (66)* |
| 5 | N. Grove St. south edge of Moseley Bldg. | 67 | 69 | 73 | 70 |
| 6 | N. Grove St. near parking garage entrance | 65 | 67 | 73 | 68 |
| 7 | N. Anderson St. MGH property line | 59 (55) | 63 (57) | 67 (61) | 64 (58) |
| 8 | MGH Courtyard Bartlett Hall | 57 | 57 | 65 | 58 |
| 9 | Blossom St. east side Blackstone School | 59 | 65 | 71 | 67 |
| 10 | Cambridge St. north side Boston Five Cent Bank | 67 | 73 | 77 | 75 |
| 11 | Cambridge St. south side N. Grove St. | 67 (61) | 73 (69) | 79 (77) | 76 (73) |
| 12 | Parking garage B entrance Parkman St. | 61 | 65 | 71 | 67 |
| 13 | Bullfinch Bldg. main entrance | 69 | 71 | 71 | 71 |
| 14 | N. Grove St. south of Cambridge St. | (53) | (61) | (69) | (65) |

*Figures in parentheses represent night-time measurements.

TABLE B-2
USAGE FACTORS OF EQUIPMENT
IN NONRESIDENTIAL CONSTRUCTION*

| Equipment** | | Construction Phase | | | | |
|---|---|---|---|---|---|---|
| | | Clearing | Excavation | Foundation | Erection | Finishing |
| Air Compressor | [81] | | 1.0(2) | 1.0(2) | 1.0(2) | .4(2) |
| Backhoe | [85] | .04 | .16 | | | .04 |
| Concrete Mixer | [85] | | | .4 | .4 | .16 |
| Concrete Pump | [82] | | | .4 | .08 | .08 |
| Concrete Vibrator | [76] | | | .4 | .1 | .04 |
| Crane, Derrick | [88] | | | | .16 | .04 |
| Crane, Mobile | [83] | | | | .16(2) | .04(2) |
| Dozer | [80] | .16 | .4 | | | .16 |
| Generator | [78] | .4(2) | 1.0(2) | | | |
| Grader | [85] | .08 | | | | .02 |
| Jack Hammer | [88] | | .1 | .04 | .04 | .04 |
| Loader | [79] | .16 | .4 | | | .16 |
| Paver | [89] | | | | | .1 |
| Pile Driver | [101] | | | .04 | | |
| Pneumatic Tool | [85] | | | .04 | .16(2) | .04(2) |
| Pump | [76] | | 1.0(2) | 1.0(2) | .4 | |
| Rock Drill | [98] | | .04 | | | .005 |
| Roller | [74] | | | | | |
| Saw | [78] | | | .04(3) | 1.0(3) | |
| Scraper | [88] | .55 | | | | |
| Shovel | [82] | | .4 | | | |
| Truck | [91] | .16(2) | .4 | | | .16 |

*Numbers in parentheses represent average number of items in use, if that number is greater than one. Blanks indicate zero or very rare usage.

**Numbers in brackets [ ] represent average noise levels [db(A)] at 50 ft.

TABLE B-3
IMMEDIATE ABATEMENT POTENTIAL OF
CONSTRUCTION EQUIPMENT

| Equipment | Noise Level in dB(A) at 50 ft. Present | Noise Level in dB(A) at 50 ft. With Feasible Noise Control* | Important Noise Sources** |
|---|---|---|---|
| Earthmoving | | | |
| Front Loader | 79 | 75 | E C F I H |
| Backhoes | 85 | 75 | E C F I H |
| Dozers | 80 | 75 | E C F I H |
| Tractors | 80 | 75 | E C F I W |
| Scrapers | 88 | 80 | E C F I W |
| Graders | 85 | 75 | E C F I W |
| Truck | 91 | 75 | E C F I T |
| Paver | 89 | 80 | E D F I |
| Materials Handling | | | |
| Concrete Mixer | 85 | 75 | E C F W T |
| Concrete Pump | 82 | 75 | E C H |
| Crane | 83 | 75 | E C F I T |
| Derrick | 88 | 75 | E C F I T |
| Stationary | | | |
| Pumps | 76 | 75 | E C |
| Generators | 78 | 75 | E C |
| Compressors | 81 | 75 | E C H I |
| Impact | | | |
| Pile Drivers | 101 | 95 | W P E |
| Jack Hammers | 88 | 75 | P W E C |
| Rock Drills | 98 | 80 | W E P |
| Pneumatic Tools | 86 | 80 | P W E C |
| Other | | | |
| Saws | 78 | 75 | W |
| Vibrator | 76 | 75 | W E C |

*Estimated levels obtainable by selecting quieter procedures or machines and implementing noise control features requiring no major redesign or extreme cost.

**In order of importance:

T Power Transmission System, Gearing
C Engine Casing
E Engine Exhaust
P Pneumatic Exhaust
F Cooling Fan
W Tool-work Interaction
H Hydraulics
I Engine Intake

# APPENDIX C

## SUBSURFACE SOIL ANALYSIS

CONSULTING GEOTECHNICAL ENGINEERS AND GEOLOGISTS

HALEY & ALDRICH, INC.
238 MAIN STREET · CAMBRIDGE · MASSACHUSETTS 02142
617/492-6460

HARL P. ALDRICH, JR.
THOMAS K. LIU
EDMUND G. JOHNSON
MARTIN C. MURPHY

PETER L. LeCOUNT
DONALD E. REED
DAVID E. THOMPSON
EDWARD B. KINNER

CONSULTANT
CHARLES C LADD

31 January 1975
File No. 3576

Resource Planning Associates, Inc.
44 Brattle Street
Cambridge, Massachusetts 02138

Attention: Ms. Holly Kinley

Subject: Proposed Massachusetts General Hospital Ambulatory Care Center, Boston, Mass.

Gentlemen:

This letter summarizes the results of our preliminary geotechnical engineering studies in connection with the preparation of an environmental impact statement for the proposed Massachusetts General Hospital Ambulatory Care Center, Boston, Massachusetts.

As part of this study, we have assembled readily available information on subsurface soil and rock conditions, groundwater and foundation systems of buildings occupying or adjacent to the site. Based on the assembled information, preliminary analyses have been made for the geotechnical aspects of foundation design and construction and site development problems.

The conclusions presented in this letter are preliminary, based on assumed conditions, and are intended only for use in the preparation of an environmental impact statement for this project. Actual foundation design and construction criteria must be based upon additional investigations and geotechnical studies to better define subsurface conditions and physical properties.

ASSUMED CONDITIONS

A. Proposed Ambulatory Care Center (ACC)

The ACC has been assumed to be located as shown on Figure 1, with two floor levels below ground surface and a maximum of 13 floor levels above ground surface. The lowest floor grade will be at El. 0 (Boston City Base). The proposed structure will connect with the existing White Building and Parking Garage B.

B. Subsurface Soils and Groundwater

Subsurface soil conditions in the proposed building area, have been assumed to be as shown on Figures 2 and 3. Soil conditions have been developed from boring information available at the Massachusetts General Hospital (MGH). Figure 1 shows the approximate locations of the borings available for this study. Logs for the borings are not included with this letter but are available from MGH. Where ground surface elevations were not available on boring logs, topographic information from the Boston Redevelopment Topographic and Planimetric Survey plan for the area was employed.

Based upon records at MGH, groundwater has been assumed to exist at El. +8. From our experience with deposits of Boston Blue Clay, the clay stratum has been assumed to be overly consolidated, subjected to a previous stress of at least 1 ton per sq. ft. above the current existing stress.

C. Existing Building Foundations

Based on construction drawings available at MGH, and recollection of MGH personnel the following foundation conditions have been assumed for buildings occupying or adjacent to the ACC site:

| Building Name | Foundation Type | Probable Bearing Material |
|---|---|---|
| White | Step-taper Piles & Caissons | Glacial Till |
| Moseley | Wood piles | Clay |
| Walcott | Wood piles (?) | Clay (?) |

| Building Name | Foundation Type | Probable Bearing Material |
|---|---|---|
| Clinics | Wood piles | Clay |
| Garage A | Caissons | Clay |
| Garage B | Spread footings or Caissons | Clay |
| Bartlett Hall | Spread footings | Clay |

## PROBABLE ACC FOUNDATION SYSTEM

Based on the assumed subsurface soil conditions, building geometry, and clay properties, it appears that the ACC may be founded on a reinforced concrete mat bearing on the stiff clay existing at the proposed lowest floor elevation. The basement area should be waterproofed and the mat foundation structurally designed to resist hydrostatic uplift pressures.

The use of a mat foundation will cause long-term consolidation settlements of the underlying clays and thus settlement of the proposed structure. Given the assumed clay properties, this settlement should be within tolerable limits for the proposed structure.

Construction of the proposed basement area and mat foundation will require lateral support of the surrounding soils and construction dewatering. The most probable lateral support system would be steel sheet piling driven into the clays with an impact pile driving hammer. If steel sheet piling is employed, construction dewatering would probably be handled by conventional pumping from sumps inside the excavation.

## CONSTRUCTION IMPLICATIONS

### A. Existing Structures

The construction of the ACC on a mat foundation will probably result in minor settlement of buildings supported by the clay stratum within approximately 50 ft. of the proposed structure, primarily the Clinics Building and Parking Garage B. With the assumed clay properties, the settlement would be within tolerable limits for the structures. Differential settlements should be anticipated at the interface between the ACC and the White Building and the ACC and Parking Garage B. Structural

details are available to accomodate such differential settlement.

If the proposed basements are to extend to Parking Garage B, minor underpinning of some of the Garage foundations may be necessary.

### B. Temporary Lateral Support System

Steel sheet piling is the more technically desirable method of providing temporary lateral support during construction of the mat foundation and basement areas. The sheeting would probably be installed with an impact pile driving hammer operated by compressed air, steam or diesel fuel. The use of a vibratory hammer, at a premium cost, is not considered feasible due to the presence of stiff clay, making sheeting penetration difficult. It is estimated that installation of the required sheeting system will take approximately four to five weeks.

Noise associated with the installation of steel sheet piling may be reduced by using alternate lateral support systems, all of which will involve extra costs. Steel soldier piles and wood lagging may be used, however it is probable that an elaborate temporary dewatering system will be required. To minimize noise, the soldier piles could be installed in predrilled holes and grouted in place below the excavation. Alternately, a reinforced concrete diaphragm wall constructed by the slurry trench technique could be employed. This method would result in a substantial premium cost but would minimize noise and construction dewatering.

### C. Groundwater

Waterproofing of basement areas and designing to resist hydrostatic uplift pressures, as recommended, will allow the construction of the ACC without adversely affecting long-term groundwater levels. A permanent underdrain system to relieve hydrostatic pressures is not recommended.

Dewatering operations for foundation construction employing steel sheet piling or a diaphragm wall should not cause any detrimential effects as only minor groundwater lowering would be anticipated outside of the excavation area.

If water bearing sands are not present in the building area, soldier piles and wood lagging may be an acceptable alternative to steel sheeting. However, if water bearing sands are present,

construction dewatering would probably require the use of deep exterior well points to dewater the sands. To minimize the possibility of damage to surrounding utilities and structures supported on the clays, a groundwater recharge system might also be necessary to maintain groundwater levels outside the excavation.

D. Alternate Foundation System

If design-phase geotechnical engineering studies reveal that the ACC would be subjected to adverse long-term settlements with a mat foundation, the probable foundation system would then be deep piles, bearing in the underlying glacial till or bedrock. The piles would be driven with conventional pile driving equipment. The use of a sonic or vibratory hammer is not considered to be an economically or technically justifiable means of installing the piles. To minimize construction noise, the piles might be placed in holes preaugered through the clays and then driven to the required penetration resistance. It is estimated that preaugering would increase the cost of the pile foundations by approximately 10 percent. Pile installation with one pile driving rig would take an estimated two to three months.

We have enjoyed working with you on this project. If you have any questions or require additional information please do not hesitate to contact us.

Sincerely yours,
HALEY & ALDRICH, INC.

W.E. Stimpson

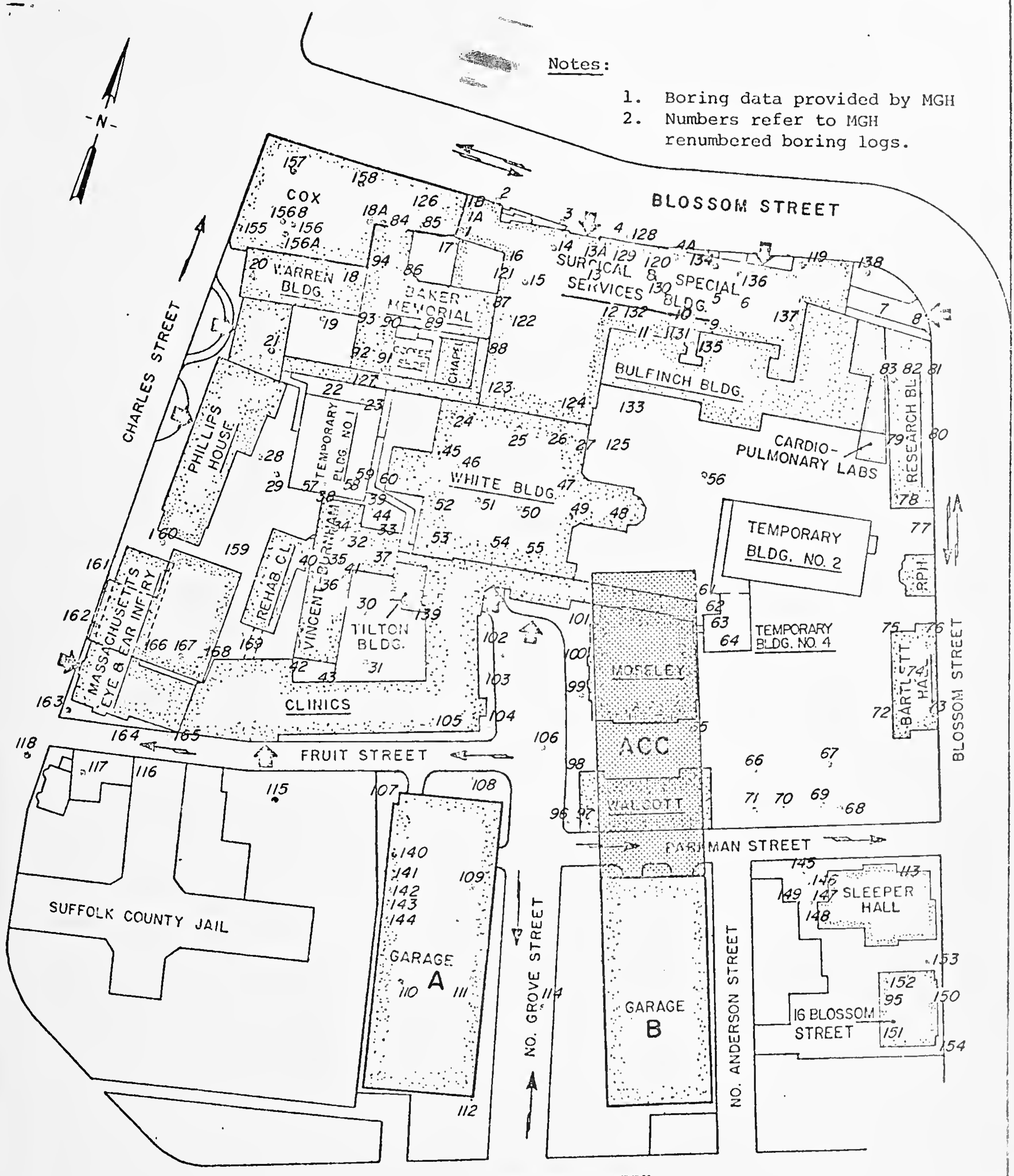
Wesley E. Stimpson
Project Engineer

Thomas K. Liu

Thomas K. Liu

WES:pc

cc: Wallace, Floyd, Ellenzweig & Moore, Inc.; Mr. David Wallace




0 25 50 75 100 150 200
FEET

# BORING LOCATION PLAN

MASSACHUSETTS GENERAL HOSPITAL

BOSTON, MASS.

DRAWN APRIL 9, 1958

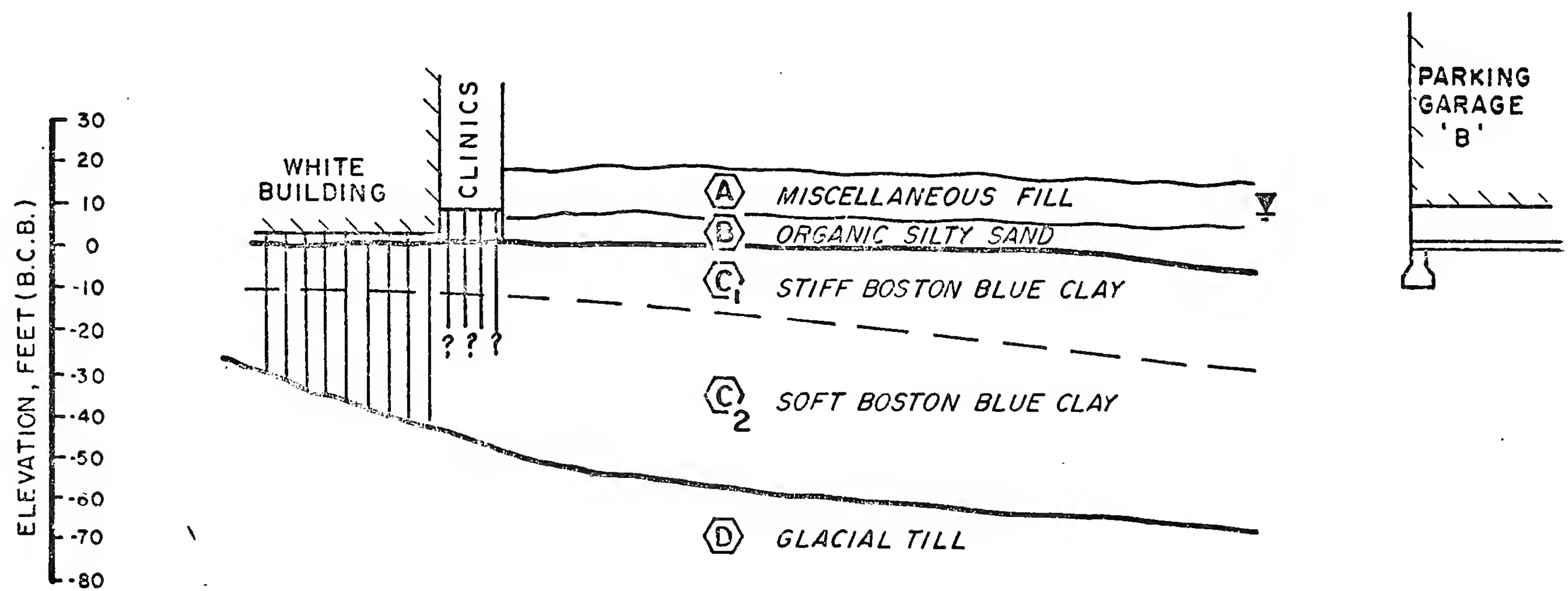
REVISED JANUARY 1972 APRIL 4, 1973 JULY 22, 1974

HALEY & ALDRICH INC.

FIGURE 1

FILE NO. 3576

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS




Note: Soil profile generalize for boring data available from Massachusetts General Hospital.

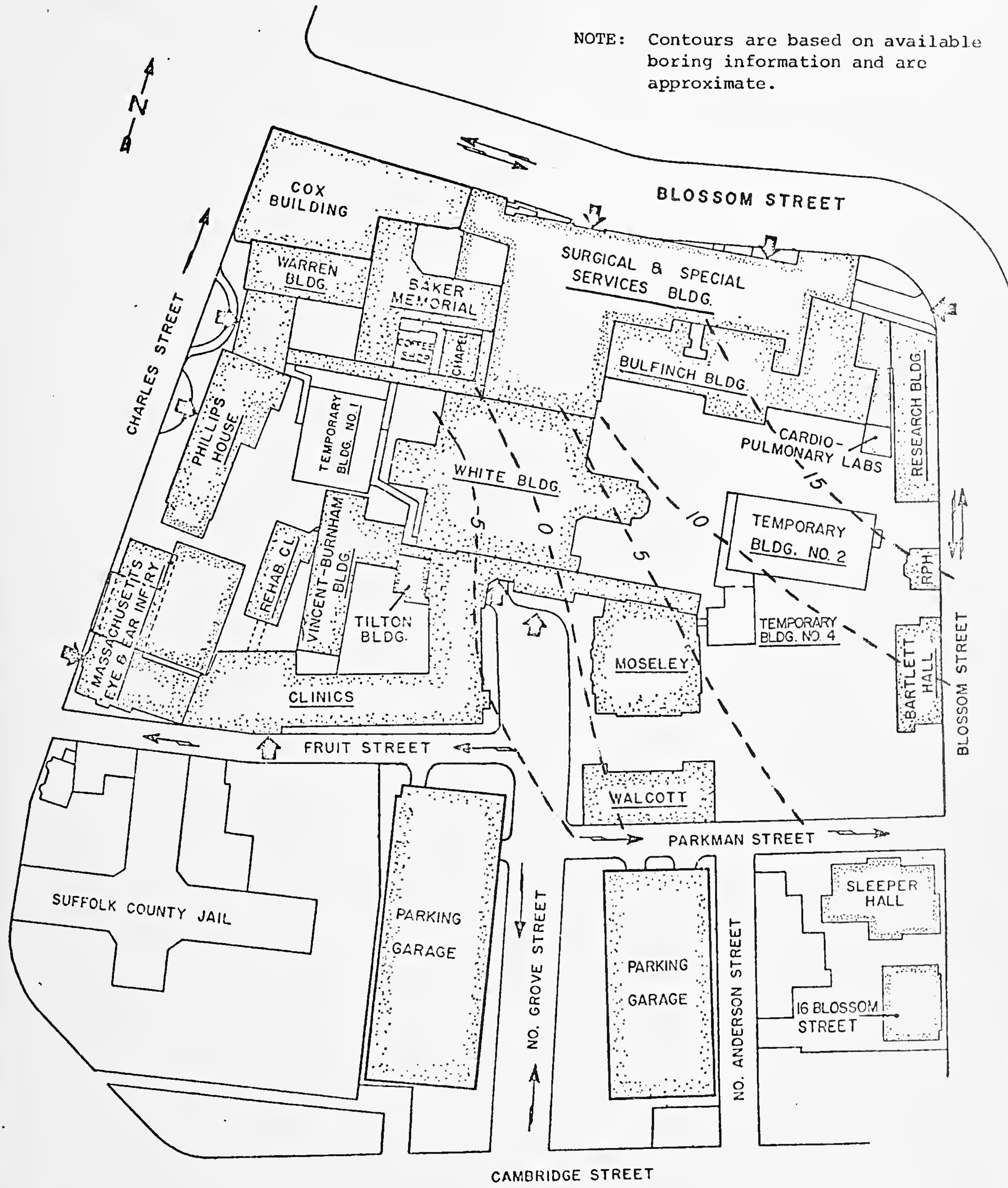
MASSACHUSETTS GENERAL HOSPITAL
BOSTON, MASSACHUSETTS

GENERALIZED SOIL PROFILE

0 25' 50' 75' 100'

FEBRUARY 1975

FIGURE 2




CONTOUR PLAN
TOP OF NATURAL INORGANIC SOIL

MASSACHUSETTS GENERAL HOSPITAL
BOSTON, MASS.

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FEET

DRAWN APRIL 9, 1958
REVISED JANUARY 1972 APRIL 4, 1973 JULY 22, 1974

HALEY & ALDRICH, INC.

FIGURE 3

# APPENDIX D

# COMMENTS ON THE DRAFT EIR AND RESPONSES TO THE COMMENTS

The Commonwealth of Massachusetts
Executive Office for Administration and Finance
Office of State Planning ~~and Management~~

~~THOMAS O'BRIEN~~
~~DIRECTOR~~
Frank T. Keefe
Director

Leverett Saltonstall Building, Room 909
100 Cambridge Street, Boston 02202

AREA CODE 617
727-5066

June 5, 1975



Ms. Jane Kreamer
Department of Public Health
Certificate of Need Program
600 Washington Street
Boston, MA

RE: A-95 Review of Draft EIR for Massachusetts General Hospital Ambulatory Care Center
State Clearinghouse Identifier 75040375
EOEA #01273

Dear Mr. Kreamer:

Pursuant to the provisions of OMB Circular A-95 and Chapter 30, Section 62 of the Massachusetts General Laws, the State Clearinghouse has reviewed the above cited Draft Environmental Impact Report.

The following State agencies were asked to review and comment on the Report: the Departments of Community Affairs, Natural Resources, Public Health, and Public Works; the Massachusetts Historical Commission; and the Coastal Zone Management Program.

Responses from the Department of Public Works and the Massachusetts Historical Commission found the Report to be adequate and not in conflict with those agencies' programs.

The Department of Community Affairs found the Draft EIR adequate, making the following comment:

> This report adequately addresses the environmental impact of the proposed project and contains sufficient information to provide guidance to those concerned to mitigate any adverse environmental effects of the project.

The Department of Natural Resources has determined that the Report adequately addresses the environmental effects, and offers the following comment on vacated space:

> In concurring with the adequacy of this report the Department notes that some information on the re-use of the vacated space brought about by this project should be included in the EIR. This would be relevant to the projects increased impact of parking, sewer, water, etc.

In light of the above, the State Clearinghouse finds that the Draft EIR adequately describes the environmental impact of the proposed MGH Ambulatory Care Center, and that the proposed project is not known to be in conflict with State plans, programs or objectives.

Sincerely,

Frank T. Keefe
Director of State Planning

FTK/SC/meh

enclosures: A-95 comments

The Commonwealth of Massachusetts
Executive Office for Administration and Finance
Office of State Planning and Management
Leverett Saltonstall Building, Room 909
100 Cambridge Street, Boston 02202

AREA CODE 617
727-5066

MAY 28 1975

REQUEST FOR REVIEW OF ENVIRONMENTAL IMPACT REPORT
MASSACHUSETTS STATE CLEARINGHOUSE (727-4154)

):	Commissioner Joseph Brown
DNR

DATE April 30, 1975

REPLY DUE: May 21, 1975

ITLE OF REPORT: Draft EIR/Ambulatory Care Center

IPACT AREA: Massachusetts General Hospital

LEARINGHOUSE IDENTIFIER: 75040375

ne Massachusetts State Clearinghouse has received the above referenced Environmental npact Report and is referring it to your agency for review and comment. Please focus pur review on the techical adequacy of the report within your agency's jurisdiction nd expertise. Any conflicts with your agency's programs should be noted. Please comment below, using additional sheets if necessary, and return your comments by the due ate noted above.

| REPORT | | PROJECT | |
|---|---|---|---|
| [ ] | Impact report adequate | [XXXXX] | Project not in conflict with this agency's programs |
| [ ] | Impact report not adequate (see comments) | [ ] | Project is in conflict with this agency's programs (see comments) |

NOTE: Please check the appropriate box in each column with respect to your agency's response.)

xplanatory comments:

In concurring with the adequacy of this report the Dept. notes that some information on the reuse of the vacated space brought about by this project should be included in the EIR. This would be relevant to the projects increased impact of parking, sewer, water, etc.

ignature

Joseph H. Brown
Commissioner

May 14, 1975
Date

$E00

# The Commonwealth of Massachusetts

## Executive Office for Administration and Finance

## Office of State Planning and Management

Leverett Saltonstall Building, Room 909

100 Cambridge Street, Boston 02202

AREA CODE 61
727-5066

REQUEST FOR REVIEW OF ENVIRONMENTAL IMPACT REPORT
MASSACHUSETTS STATE CLEARINGHOUSE (727-4154)

TO: Ellis Goldman
DCA

DATE April 30, 1975

REPLY DUE: May 21, 1975

TITLE OF REPORT: Draft EIR/Ambulatory Care Center

IMPACT AREA: Massachusetts General Hospital

CLEARINGHOUSE IDENTIFIER: 75040375

[illegible] - 5 1975

The Massachusetts State Clearinghouse has received the above referenced Environmental Impact Report and is referring it to your agency for review and comment. Please focus your review on the technical adequacy of the report within your agency's jurisdiction and expertise. Any conflicts with your agency's programs should be noted. Please comment below, using additional sheets if necessary, and return your comments by the due date noted above.

| REPORT | | PROJECT | |
|---|---|---|---|
| [X] | Impact report adequate | [X] | Project not in conflict with this agency's programs |
| [ ] | Impact report not adequate (see comments) | [ ] | Project is in conflict with this agency's programs (see comments) |

(NOTE: Please check the appropriate box in each column with respect to your agency's response.)

Explanatory comments:

This report adequately addresses the environmental im!act of the proposed project and contains sufficient information to provide guidance to those concerned to mitigate any adverse environmental effects of the project.

Ellis Goldman

Signature

5/28/75

Date

The Commonwealth of Massachusetts

Executive Office of Environmental Affairs

18 Tremont Street

Boston, Massachusetts 02108

Evelyn F. Murphy
~~CHARLES H. W. FOSTER~~
*Secretary*

STATEMENT OF THE SECRETARY
ON
DRAFT ENVIRONMENTAL IMPACT REPORT

The Secretary of Environmental Affairs herein issues a statement that the Draft Environmental Impact Report submitted on the below referenced project does not adequately and properly comply with Massachusetts General Laws, Chapter 30, Section 62 and the regulations governing preparation of environmental impact reports. In general the draft report was well prepared; however, there are a number of questions which should be further explored in the Final Report.

Environmental Affairs File No. 01273

Submitted By: Massachusetts Department of Public Health

Date Received: April 14, 1975

Project Identification: Massachusetts General Hospital

Ambulatory Care Center

The Executive Office of Environmental Affairs has had the benefit of a review of this Draft Report by the Institute for Man and Environment, University of Massachusetts, Amherst. Copies of this report are appended and referenced herein.

I. Method

1. The EIR should address any aspects of the project that would disrupt the minimum stress environment needed by hospital patients. See IME General Comment 2; and Specific Comments 6, 11, 12, 14-17.

2. It is possible that impacts predicted using a range of patients or patient visits might be more realistic than the given absolute numbers. This should be examined further as well as the related change in resultant impacts.

3. The visual and traffic impacts on sections of Charles River Park should be more closely examined.

4. The role of this project in contributing to cumulative construction impact to the area (i.e., Blackstone Housing Project) should be carefully considered along with such measures to mimimize harm such as appropriate construction staging and re-routing traffic.

II. Measures to Minimize Harm

1. Specific costs, implementation feasibility or some expression of commitment is needed to ensure that many of the proposed means to minimize harm are actually carried out, (e.g., slurry wall excavation technique, underground tunnel, 980 foot sky bridge). See also IME General Comment 1.

III. Alternatives

1. It would seem that a set of contingency plans suitable for "worst case" situation would be a reasonable approach to take for so critical a service facility as a hospital, given the uncertain nature and critical importance of the long-term availability of such services as parking, solid waste disposal, and sewage disposal. See IME General Comment 3 and Specific Comments 9, 19, and 22.

IV. Conclusions

Questions concerning construction impacts such as noise, dust, traffic, and operational impacts such as aesthetics, energy usage, sewage generation, traffic and parking structure, air pollution impacts and solid waste impacts should be addressed in the Final EIR.

Before proceeding to the preparation of a Final Report, the Department should carefully consider all of the comments received from state agencies and others, including this statement. During the preparation of the Final Report, the staff of this office will be available to advise the Department

5 June 75
DATE

EVELYN F. MURPHY

**Design-Science International, Inc.**

14 Story Street
Cambridge, Massachusetts 02138
Phone: (617) 492-0070
Cable: DESIGNSCI

BUREAU OF RESOURCE DEVELOPMENT
MAY 21
DIVISION OF MEDICAL CARE
MASSACHUSETTS DEPARTMENT
OF
PUBLIC HEALTH

21 May 75

Ms. Jane Kreamer
Department of Public Health
80 Boylston Street
Room 925
Boston, Massachusetts

Ms. Evelyn Murphy, Secretary
Executive Office of Environmental Affairs
18 Tremont Street
12th Floor
Boston, Massachusetts

RE: Comments - DRAFT ENVIRONMENTAL IMPACT REPORT
AMBULATORY CARE CENTER
MASSACHUSETTS GENERAL HOSPITAL
DPH No. 6-2434
EOEA No. 02173
State Clearing House Identifier 75050375

Dear Ms. Kreamer and Ms. Murphy,

This letter is Charles River Park Ten Taxpayer Group's response to the published request for comments relating to the Draft Environmental Impact Report prepared for Massachusetts General Hospital's Proposed Ambulatory Care Center. Charles River Park is the major abutter of the M.G.H. Campus and probably the neighbor most seriously effected by any physical change of the hospital.

After reviewing both the Draft Environmental Impact Report and Certificate of Need Application, Charles River Park has concluded that it has grave reservations concerning the following:

1. THE ADEQUACY OF THE DRAFT ENVIRONMENTAL IMPACT REPORT INCLUDING ITS ACCURACY, CONSISTENCY, COMPLETENESS, VALIDITY OF DATA, BASIC ASSUMPTIONS, METHODOLOGIES, PROJECTIONS, SELECTION AND TIME FRAMEWORK OF ALTERNATIVE ACTIONS AND CONCLUSIONS.

2. THE ABILITY OF THE AMBULATORY CARE CLINIC TO ACHIEVE ITS STATED GOAL OF COST EFFECTIVE AMBULATORY CARE WITHOUT FURTHER INCREASING THE DAILY NUMBER OF PATIENTS, STAFF AND THEIR RELATED IMPACTS.

3. THE BURDEN ON THE ULTIMATE CONSUMER CAUSED BY THE ADDITIONAL COSTS OF MINIMIZING THE NEGATIVE IMPACTS TO MEET THE MANDATORY CONDITIONAL

Ms. Jane Kreamer
Ms. Evelyn Murphy
21 May 75
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APPROVALS RELATING TO THE REQUIRED MITIGATING MEASURES AND RECOMMENDED DESIGN AND PERFORMANCE CRITERIA.

4. THE PROJECTED IMPACTS OF THE PROPOSED AMBULATORY CARE CENTER ON CHARLES RIVER PARK.

I ADEQUACY OF THE DRAFT ENVIRONMENTAL IMPACT REPORT

The Draft Environmental Impact Report appears to be predicated on two basic assumptions: 1. The proposed A.C.C. will contain only 265 doctors who will see a total of 2650 patients per day. 2. No growth is planned for the A.C.C. beyond 1980.

Should these assumptions be incorrect then the Impact Analysis on transportation, energy utilization, solid waste, air quality, utility infrastructure, water quality, and retail trade must be called into question. If the patient demand is less or the space of offices too great to be supported by the doctors without passing on part of their 700% projected increase in rent to the patient and thereby ending the suggestions of cost effective ambulatory care, then perhaps it would be prudent to examine the alternative of a smaller more economically viable Ambulatory Care Center. If on the other hand the demand is greater than that projected and more patients and staff utilize the A.C.C. then the impacts will also become more severe and may be unpalitable to all concerned. Or if the assumptions are correct and an A.C.C. can be constructed at a cost of $25,000,000 so that the 265 doctors can be only 12% more efficient than in their present quarters then the Department of Public Health must decide whether such a large expenditure to accomplish so little is justified.

Whatever the situation the D.P.H. and the public is saddled with a Draft EIR that reports on an analysis based on absolute numbers rather than in requested ranges. Its projection of patient visits based solely on historic M.G.H. experience are only to 1980 (probably the real opening date of the A.C.C.) when the Massachusetts Determination of Need Regulations Section 54.4 impliedly require populations until 1985. It would appear for this latter reason above that the Draft EIR is inadequate.

The fact of the matter is that the chosen numbers are either wrong and the impacts far greater then described; or, the M.G.H. is proposing a building which in no way can provide the patient with a cost effective ambulatory care at cheaper rates than are currently being charged.

Most likely the numbers are on the low side and the M.G.H. will maintain at least its historic growth rate. That rate assumes that no additional patients will be attracted to the A.C.C. because

of its planned excellent and efficient health care. M.G.H.'s reputation for the quality of care it provides makes it extremely unlikely that that assumption will be true.

If the A.C.C. is as truly successful as is hoped it no doubt will attract larger numbers of both referral and primary care patients. Since it is not M.G.H.'s policy to turn away patients, an increasing demand is foreseen. Even if the base number of 2650 is correct, and even if the M. G.H. only maintains a 4.3% growth rate, in 1985 there will be 3270 patients per day, in 1990 there will be over 4000 patients per day, and by 1997 there will be over 5300 patients per day or more than double the initial patient population. What about the impacts then? Shouldn't the planners cope with the situation now before the neighbors are forced to take the brunt of the impacts in the future? Changes of this magnitude are surely significantly beyond the normal range of daily fluctuations of which the traffic consultants write. How will a 100% increase effect the existing infrastructure and energy requirements? All we know now according to the published letters is that there is currently sufficient capacity to handle the projected loads created by 265 doctors and 2650 patients.

The impact, however, could be compounded several fold if the initial assumption was low by 25%, 50% or conceivably 100 % and the M.G.H. was to maintain its historical rates of growth. The M.G.H. maximum daily visit estimates by specialty is exceedingly low. If the demand for service was present the doctors could exceed M.G.H. estimates by 200%-300% per day according to the A.M.A.

It is obvious that not only must the basic assumptions but also the methodology of utilizing absolute numbers be further questioned. The problem of just utilizing absolute numbers is that a particular analysis or answer relates only to a specific set of criteria, and a person trying to evaluate the analysis does not know at what point a neutral impact becomes a negative impact or how great a latitude exists before a non-problem becomes a problem. What is important is to determine the plateau levels for which given criteria is relevant; the capacities effecting various impacts; and the break points at which a particular system produces negative impacts. To accomplish this a range of numbers must be considered.

If the basic assumptions are wrong what about others that have been made? For instance, in order to construct the A.C.C. many of those activities located in the Moseley and Walcott Buildings must be relocated. The Draft EIR does not adequately outline the problems in the relocation area. M.G.H. is presently occupying 17,000 square feet in the Charles River Park's office building at 100 Cambridge Street as a sub-leasee. The prime lease expires at the end of 1977. At the present time M.G.H. has made no concrete arrangements with CRP to ensure its occupancy of this space. Neither has M.G.H. made any definite arrangement directly with Charles River Park to rent 24,275 square feet the report suggests M.G.H. will use as its relocation space for

data processing, medicare records, personnel, administration and accounting. In justifying the economic loss of twenty-five doctors relocating to the A.C.C. from CRP it is assumed that they can be replaced because of the four year lead time with little or no cost for renovating their space. The assumption has no merit on two counts. 1. Tenants normally will not sign a lease that far in advance. 2. It is unlikely that another tenant can be found who has the same requirements as the doctors for whom the office were specially designed.

The decision not to consider accumulative impacts is highly questionable. The magnitude of the visual and traffic accumulative impacts are such that new conclusions must be reached. For instance when taken alone the A.C.C. blocks only a portion of the river view of the Staniford Street Towers (as well as the two apartment slabs at Hawthorne Place which were not mentioned in this report), however, when combined with the existing hospital buildings a solid wall in excess of ten stories in height and 500 feet in length provides a very significant impact. Not only the apartments with horizontal views are blocked but according to the consultants' diagram those up to the 30th floor lose their near views of the river. At least 240 apartments lose portions of these valuable views.

In similar fashion, the possible accumulative effects of any one of a number of circumstances could substantially increase the almost 800 projected deficit parking spaces which in turn would cause considerable traffic congestion around the M.G.H. Campus. Should the MEEI change its parking policy, or should the M.G.H. trade its 1,000 car Nashua Street parking lot to the City, should the projected number of cars increase through user preference or more visits caused by greater demand for the A.C.C., or should Parcel 4B be developed without adequate parking then the traffic is likely to completely break down. Such an occurence would be intolerable to both M.G.H. and its neighbors.

The accuracy, consistency, and validity of data must also be called into question if such easily verifiable items as the rent figures for the CRP's doctors offices, or the number of units in the Blackstone Housing Project are incorrect one must question those more technical items which are not so easy to verify. Depending on the point being made the capacity of various parking lots and garages vary between 25% and 50% (800-1000 cars to be parked in the Nashua Street lot and 800-1200 cars to be parked in the Charles River Park garage now under construction).

Statements claiming that only 4% of the total cost of the A.C.C. will be labor costs seriously challenge the validity of the cost estimates of the proposed Ambulatory Care Center. Buildings of comparable size currently under construction at Charles River Park are running at a labor cost to material cost rates of 45:55. This would suggest that if the labor cost for the A.C.C. is really $1,000,000 that the total cost probably would not be over $2,500,000 to $3,500,000 even if a lot of equipment is included. On the other hand if the $24,000,000 remainder for materials is correct the A.C.C. may cost between $35,000,000 to $40,000,000+.

Statements such as the following tend to be contradictory and bring into question the validity of the entire analysis. page VI-50- "Given the existing network and proposed improvement plans, construction of the A.C.C. would not by itself, exceed water, sewer, steam, and electricity supplies available in the area." - page VII-10 "Although the proposed A.C.C. appears to have no serious utility impacts, it is impossible to estimate its exact impacts on water and sewer loads without conducting a survey."

In referring to the completeness of the report, although Charles River Park is concerned that not all the generated information has been published in this report and that specific requests stated in letters in the appendices of the Draft EIR have not been addressed, CRP's primary concern is the fact that the major issue of economic viability has not been considered. Although it may not have been a stated requirement of the consultants to investigate this facet it is a necessary component of the analysis.

II ECONOMIC VIABILITY VS. INCREASED IMPACTS

There appears to be a major conflict between the ability of the A.C.C. to provide cost effective ambulatory care and the desire to minimize negative impacts caused by increased utilization of the A.C.C. To resolve this conflict a number of related issues must be addressed.

The increase in the cost of rent will substantially affect the cost per patient's visit. According to the Draft EIR the average private M.G.H. physician now occupies only 105 square feet of office space for which he is paying a rent of $10 per square foot. In the new A.C.C. he will occupy 640 square feet and pay $12 per square foot. This translates to a 700% increase in costs for the doctors' rent. Surely this will have a far greater impact than the $1 increase in cost per visit that is currently claimed. If the costs were equally allocated to each patient the increase would be more than 300% than that projected. Based on the Draft EIR projections the doctors can see 12% more patients in the A.C.C. than in the current quarters. Does this 12% increase in patient load offset the 700% rent increase? How will it truly affect the cost to the individual patient? Does the individual doctor really need six times his current space, or could he be equally efficient with only three times as much space? The building is apparently planned for growth to peak in 1980, and if the doctors could be efficient in a 300% increase in space does the A.C.C. have to be so large, or would it be more practical to design a smaller less costly building? A smaller building was never considered in the alternatives to the A.C.C. proposed by the Certificate of Need Application.

On the other hand, perhaps it is more logical to assume that the building is really programmed for growth and in fact has the capacity for 5,300 patients a day. Certainly the reduced rent would benefit both doctor and patient. Until this capacity is reached it is logical to assume that

the individual doctors will try to see more than the projected ten patients a day to lessen their rent burden and to build up their practice. In either case many factors including the following suggest that the demand will not peak at 2650 patients per day in 1980. 1. Historic growth patterns, 2. current switch from in-patient to out-patient care, 3. trend towards more liberal health care benefits, 4. increased draw to an A.C.C. with more advanced and more efficient services, 5. doctors' business strategy to get more patients, 6. ability of the doctors in the A.C.C. to see at least twice as many patients as projected by M.G.H. if the demand is present, 7. doctors will be more efficient because of the proximity of their offices to the in-patient facilities.

The increase in patients while lowering the costs and helping the A.C.C. to attain its goal of cost effective ambulatory care will substantially alter the calculations relating to the impacts caused by traffic, parking, energy utilization, solid waste, air quality, utility infrastructure, water quality and retail trade.

III CONDITIONAL APPROVALS

The consultants have identified a number of problems in the Draft Environmental Impact Report. They have also suggested a number of solutions and specific performance criteria which if implemented would substantially reduce these problems and their negative impacts.

Such areas of concern and suggested solutions include: 1. Noise levels of 95 DBA if steel sheet piles were driven around the foundation perimeter by standard air pile drivers with exhaust mufflers. This adverse impact could be mitigated if a slurry wall excavation technique was utilized. The cost increase is projected at 10% of the cost of the foundations. 2. Efficient removal of solid waste. Solutions include the construction of an underground tunnel. No cost is projected. 4. Pedestrian circulation from the MBTA to the new A.C.C. A 980 foot skybridge is suggested. No cost is given. 5. Maintenance of utility functions. It is suggested that existing utilities under Parkman Street and the closed-off portion of Fruit Street be relocated. No costs are estimated.

The resolution of these problems and the adherence to the suggested design criteria and performance standards will significantly add to the projected $25,000,000 cost of the Ambulatory Care Clinic. Since no costs have been estimated it is impossible and not proper to make judgments as to the viability of these suggestions.

The laws of the Commonwealth (specifically Chapter 30 Section 61) require that not only the impact on the environment be determined but that all practical means and measures to minimize damage to the environment be taken. In light of this statuatory requirement the DPH has no

alternative but to condition its approval of the Certificate of Need, if any approval is given, on the implementation of the mitigating measures described in the EIR. It is clear that the cost of these mitigating measures will increase the cost of the A.C.C. over its budget of $25,000,000. Even if these additional costs equal only 10% of the total project cost, that is an additional $2,500,000, which will have to have an upward effect on rent and patient fees.

IV PROJECTED IMPACTS ON CHARLES RIVER PARK

As has been related, Charles River Park is greatly concerned over a number of the projected impacts. Although some of these long-range impacts including the blockage of views and loss of office tenants will cause severe economic hardship to Charles River Park, they will not have a serious affect on the other neighbors. Others of both long and short duration such as traffic and parking will create operational problems and inconvenience for the entire neighborhood. Although the consultants maintain that part of this type of problem can be mitigated by strict policing, M.G.H. has demonstrated over the years that it cannot guarantee that the city will enforce the parking regulations.

But of all the projected impacts, perhaps the one which may have the most detrimental long-range effect relates to zoning and its attendant problems of density, massing, parking, traffic, open space and environment. The M.G.H. Campus is zoned H-4 (residential-FAR of 4). Given this as a restraint the developers of Charles River Park have planned and are in the process of completing a $100,000,000 development. Its buildings have been sited to both accommodate the legal restraints of its neighbors and to provide its occupants with maximum views, and a pleasant environment. After having made this substantial investment, CRP feels that it would be unjust for its neighbor to exceed the density limitations imposed by the zoning.

Should a variance be granted for the A.C.C. (as part of the overall M.G.H. Campus) the precedent would be set for further expansion above the zoning limits. There is absolutely no question, that based on the record M.G.H. will continue to grow. In the past its physical growth has been unplanned and chaotic, but its growth has taken place principally within its legal envelope. Now that the M.G.H. has attained the upper limits of its legal density it is critical for the welfare of its neighbors and community that the precedents set with any approval of the A.C.C., including conditional approvals to ensure that mitigating measures be taken to minimize harm will provide for an orderly, justified and reasonable future growth.

CONCLUSION

Charles River Park has dealt with only those points of the Draft EIR which it is knowledgable. Based on its findings within its limited frame of knowledge, CRP questions what else outside

Ms. Jane Kreamer
Ms. Evelyn Murphy
21 May 75
Page Eight

of this limited area may be invalid and further add to the report's questionable validity and adequacy.

It is our opinion that the Draft Environmental Impact Report leaves many unanswered questions and unresolved issues. The magnitude of some of these demand explanation and resolution before the project continues. There should be another public hearing at which questions are answered, assumptions are more fully explained, and the conclusions are justified.

In addition, the Department of Public Health should make clear its position on adopting the recommended mitigating measures and performance criteria as conditions for approval in order to provide a guarantee to the neighbors that they will not be unduly harmed.

We trust that the Department of Public Health will carefully scrutinize all of the presented materials, the assumptions on which the impacts were predicted, and the true costs to the ultimate patient for providing one standard of ambulatory care before approving an expenditure which may substantially exceed the projected $25,000,000 if the project is to go ahead with the recommended safeguards and mitigating measures. If the DPH cannot justify the total program of the A.C.C. and its attendant impacts we hope that the Department will insist on reasonable changes so that the project will meet the needs of the community and region, be economically viable, and cause a minimum of harm to its neighbors.

Respectfully submitted,

Design-Science International, Inc.
Agent for Charles River Park Ten Taxpayer Group

by Robert F. Loverud
ROBERT F. LOVERUD, President

cc M.G.H.-Dr. Jerome Grossman
A Agency
B Agency
Robert Fondren, Esq.
State Clearinghouse

Beacon Hill Civic Association
74, Joy Street, Boston



This is a report of the Beacon Hill Civic Association Committee to evaluate the environmental impact statement related to the proposed Massachusetts General Hospital Ambulatory Care Center. This committee was established by a vote of the Directors of the Beacon Hill Civic Association on December 11, 1974. This committee has reviewed the environmental impact report and would like to make several comments and suggestions. Although we found the report to be competent, we found that in several areas it is vague and non-responsive to questions raised by the Beacon Hill Community.

VISIT PROJECTIONS

The Report fails to deal with the impact of potential alternative patient volumes in future years. For unexplained reasons, a requested computation of potential variations of patient visitations has been omitted from the Report. Instead, all environmental impacts are based on just one alternative usage, namely, 2,650 daily patient visits. The accuracy of the 2,650 forecast cannot be questioned either way, but it is just one forecast, based on just one assumption, that exactly 265 doctors will see exactly 2,650 patients per day.

The Hospital has indicated its unwillingness to accept conditions upon its future use of the facility. "Times change," they say,

"and we cannot be bound in ten years by use restrictions imposed now." Similarly, the community cannot rely on an environmental impact assessment tied only to today's projected use plan which will probably change.

If, for example, changing times dictated a modification in teaching techniques and research the ACC might be attended by physicians interested only in treating patients. Even under today's AMA standards, the same number of physicians could then double the patient visitation level to over 5,300 daily visits in the same physical facility. 2,650 additional daily visits could, for example, increase parking demand by over 425 spaces, and parking is already inadequate. Yet, the Report fails to assess the environmental impact of 5,300 patients visits per day.

The issue does not hinge on whether or not 5,300 daily visits are likely, but rather whether this number of visits could be feasible in this facility given a change of policy or techniques in the future. The Report should demonstrate the reasonable maximum number of visits the neighborhood environment can tolerate and the facility should be legally limited to this maximum.

TRAFFIC AND PARKING

The significance of traffic-volume statistics is not readily understandable from the figures in the report. These statistics

should be supplemented by graphs in time on typical week days in 1974 and 1980, with Hospital and Clinic traffic contributions shown in differing texturw symbols from regular City volumes. With this simple graph it can be better understood when and what size peaks occur and the impact of the Hospital and Clinic loads. Such graphs would also be useful in understanding parking requirements.

Since the Report admits that a parking deficiency already exists and that construction of the ACC will add to this deficiency, there is a need to implement the suggestions to reduce this deficiency. There is no logical reason to wait until construction is approved before making every effort to reduce congestion around the MGH and to solve the long standing parking problems. Programs that could be tried immediately include an all-campus effort to use public transportation, a step up in the shuttle service facility operated by the Hospital, an all out drive to enforce parking and traffic laws around the campus, hold meetings with the MDC and Boston traffic administrators concerning the operation of traffic lights, a review of priorities for parking rights in the garages, and all other Performance Criteria as shown on page VII-29 of the Report.

Since the residents of Beacon Hill are continually concerned about traffic congestion and parking problems, it might be helpful for the Department of Public Health to require the MGH to commence

the procedures suggested in the Report before final approval is given for the Ambulatory Care Center. Such a decision could bring improved conditions now and prepare the way for any new impact that the ACC might create.

BULFINCH BUILDING

The Beacon Hill Community is very much aware of the architectural and historical significance of the Bulfinch Building and stresses the importance of generally enhancing it and, in particular, reinforcing the view down North Anderson Street. Therefore, the swinging of the proposed ACC Building to the east, across the view, for the purpose of diminishing wind velocities (as illustrated in Options B and C, page VII-4), is considered a poor trade-off. The method of diminishing wind velocities with architectural elements such as canopies and screens should be emphasized as an alternative to blocking the view.

Assuming that the temporary buildings are in fact "temporary", the fairer impact comparison would be the "ACC Building Option" compared to the "permanent" MGH structures without the "temporary" buildings. In this case it should be pointed out that the ACC shadow patterns shown on Page VI-96 and Page VI-97 will affect the Bulfinch Building and courtyard considerably more than those of the existing MGH "permanent" buildings. Also, the degree to

which the present Bulfinch area is "chaotic" (Page VI-91) is in large part attributable to the temporary structures.

The value judgment that the proposed ACC will be a complementary backdrop the the Bulfinch Building is debatable. Another and perhaps equally valid judgment is the the ACC, as indicated, will be a massive visual irritant, placing the Bulfinch Building and its courtyard yet deeper in a canyon. The proposed ACC disrespects the Bulfinch's axial symmetry and, assuming the ACC to have something in common with the busy elevations of the White, Jackson, and Grey Buildings, it is very apt to aggressively compete with the Bulfinch Building rather than serve as a sympathetic backdrop.

On Page VI-103 after the conclusion on Nonconformity: "The new building will conform to surrounding hospital uses," add the words "but it obviously cannot conform in scale, mass, and design to the historic resource. Successfully complementing the Bulfinch Building with the given economic bulk requirement of the ACC will be one of the most difficult problems facing the architects."

RELOCATION

The Report fails to deal adequately with relocation problems. Uses aggregating 27,626 square feet of floor area are "to be

eliminated" (p.VI-118), but no explanation is given as to why these facilities are, in fact, no longer needed.

Most significant is the potential impact on the neighborhood housing market resulting from elimination of the student nurses' dormitories. The Hospital has not committed definitely to elimination of all teaching of student nurses; although the Report states this activity will be discontinued, this would not be binding upon the Hospital, and no termination date is specified.

The Report should discuss the potential impact of student nurses, at undergraduate or graduate levels, seeking housing in the private sector. Related to this problem is the potential future use of the former Lincolnshire Hotel; Hospital plans regarding the future of this facility also should be disclosed.

Similarly, the Hospital should disclose planned uses of space which will be vacated as the result of relocation of existing departments and facilities to the new ACC, that is, what will the newly vacated space be used for next and what will be the environmental impact of these new uses.

MASTER PLAN

The community and, it would appear, the environmental consultants, would be greatly aided in assessing the long-range environmental impact of the proposed ACC if the Hospital also furnished any plans which it may currently have for demolition or construction in the immediate vicinity of the ACC. The community appreciates that long-range planning is a difficult art at best and that plans which now seem certain may well have to be discarded within a few years' time for medical, monetary or other reasons. Nevertheless, the environmental impact statement is prepared on the basis that most of the buildings in the immediate vicinity, despite in some cases their extreme age, are going to remain. This may be an erroneous and possibly detrimental assumption.

For example, the clinics building immediately facing the proposed ACC would appear to the non-professional observer to have almost completed its useful life and that proposed demolition of such building within the next five years would not appear unrealistic. A changed use in this crucial area could have a far reaching impact on many of the questions currently being dealt with in the EIS. One important area would be the wind effects created by the proposed ACC. All of the studies shown in the EIS assume the continued existence of the clinics building at its current height. If within five years it is proposed by the Hospital to build a taller structure on that location, it seems unfortunate that such fact

cannot be considered at this time in arriving at the proper shape and height of the ACC. A solution which now appears to minimize the adverse wind impact on the basis of surrounding topography which may be slated for demolition does seem short-sighted.

Again, it is emphasized that this request is not an attempt to preclude the Hospital from changing its mind in the future or forcing it to make plans which are not currently possible to make. Nevertheless, where such plans are contemplated or where the physical condition of a building strongly suggests that its continued long-term existence is extremely questionable, these factors, it would seem, should be taken into account in assessing and hopefully minimizing the impact of a structure the magnitude of the ACC.

OTHER QUESTIONS

1. Elaborate on the real estate tax consequences relative to this construction?
2. There should be more information regarding the conclusion that the ACC will not affect the water pressure on Beacon Hill.
3. What happens if the MEEI parking lot on Storrow Drive, in front of the building, is closed by the MDC? What impact on traffic and parking on the MGH campus.
4. If the new Suffolk County Jail is built on the present site of the MGH parking lot on Nashua Street, what happens to those cars.

Respecfully submitted,

Beacon Hill Civic Association,
Evaluation Committee

Maurice E. Frye, Jr., Chairman
Bernard D. Borman, Esq.
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Review of
Draft Environmental Impact Report
Ambulatory Care Center
Massachusetts General Hospital,
Boston, Massachusetts

IME-EIRRP-63; EOEA-01273

Prepared for

The Executive Office of Environmental Affairs

by

The Center for Environmental Policy Studies

Institute for Man and Environment

University of Massachusetts

Amherst

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Table of Contents

## INTRODUCTION

This is one of a series of reviews of environmental impact reports, environmental impact statements, and other projects having to comply with the Massachusetts Environmental Policy Act (M.G.L. Ch. 30, S. 62). This particular report is a review of the Draft Environmental Impact Report for the Ambulatory Care Center, Massachusetts General Hospital, Boston, Massachusetts. The report was reviewed by staff members of the Center for Environmental Policy Studies under faculty supervision.

Richard C. Smardon
Associate Planner
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GENERAL COMMENTS

1. The general concerns of this Draft Environmental Impact Report are major planning considerations independent of specific design solutions. The argument for this type of strategy in preparing an environmental impact report is well presented in the sections describing possible means to minimize harm and design criteria. The consequence of this strategy is the uncovering of several potential alternative approaches to each major problem. The major drawback of this method is that it may appear to be only a list of good ideas without any expressed commitments to or desires for a preferred plan of action. These review comments are necessarily limited by the lack of specific design proposals or a desired plan of action. They may therefore be best considered as a form of feedback to aid in the preparation of a final proposal. At that time, a more detailed review may be in order.

2. Particular standards for environmental quality normally are based upon tolerable levels for healthy adults. A hospital zone would suggest a different approach to standards, however. Patients that are ill or bedridden are particularly sensitive to environmental stress. One aspect of the care of hospital offers is an environment with minimum stress. The EIR should therefore address any aspects of the project that would disrupt this minimum stress environment (i.e. noise, dust, etc.). See also comments 6, 11, 12, 14, 15, 16, and 17.

3. The case is well presented concerning the uncertain nature and critical importance of the long-term availability of such services as parking, solid waste disposal, and sewage disposal. Generally speaking, it is assumed that existing services can be adapted to fulfill projected needs. This is done with full awareness that the number of existing parking spaces reserved for Massachusetts General Hospital use will decrease, that Boston has no plans for solid waste disposal after the closing of the Roxbury Sanitary Landfill and the Boston incinerator and that Boston's system for sewage treatment is inadequate at best. As firmer plans of action are formulated to deal with these situations, it would seem wise to also develop a set of contingency plans suitable for the "worst possible" situation. This would seem to be a reasonable approach to take for so critical a service facility as a hospital. See also comments: 9, 19, and 22.

Additional Comments

II Introduction and Summary

Summary of Environmental Impacts and Mitigating Measures

Air Quality

p. II-8 4) What effects might the use of calcium chloride to reduce airborne dust have on local soil fertility, as a corrosive agent in the storm sewer system, or in other areas?

III Description of the Ambulatory Care Center

Purpose and Scope of Project

p. III-1 5) What effects upon medical service costs can be expected as a result of the project? Aspects other than direct construction costs should be considered, such as the elimination of the distinction between private and clinic patients.

V Description of the Environment

Environmental Considerations

Current Nature of Man's Use of the Area

p. V-9 6) What will be the joint air, noise, traffic and other impacts associated with the projected simultaneous construction of other projects in the vicinity of Ambulatory Care Center?

VI Environmental Impacts and Mitigating Measures of the Ambulatory Care Center

Land Use

p. VI-5 7) One of the temporary buildings in the Bullfinch Courtyard is designated for recreation use in Figure VI-1, Existing Land Use. What activities are referred to and where will they be accommodated if the proposed project is constructed?

Energy Utilization

p. VI-34

8) Will standby power be available for critical equipment as well as for lighting, in the event of a power failure?

Water Quality

Environmental Effects

p. VI-58

9) Is the capacity of the West Side Interceptor going to be increased above present levels? If not, most additional input into the sewage collection system is going to flow into the Boston Marginal Conduit. Although most solids and bacteria will be removed by the proposed chlorination-detention-pumping station, much of the biochemical oxygen demand (BOD) will remain in the effluent. This effluent could exert a significant oxygen demand on the waters of Boston Harbor. Because of the uncertainty of the capability of the existing situation to accommodate existing loads, it might be appropriate to prepare a contingency plan for the "worst possible" condition. Such a plan might consider the installation of a "package" treatment plant.

Measures to Minimize Harm

10) What steps will be taken to minimize the turbidity loading of site runoff during the construction phase of the project? What other impacts besides dust control could be expected?

Air Quality

Impacts Associated with Demolition and Construction

p. VI-60

11) It would seem that dust generated during the demolition and construction phase of this project represents a potential health problem from the impact of respirable dust on in-patients at the Hospital. All means to minimize this impact should be examined.

Impacts Associated with Traffic

p. VI-62

12) Present ambient CO levels at the site should be given, as should total CO levels expected at the time of project completion. Predictions for CO levels for 1980 should consider the contributions of on-site parking facilities and special problems relating to through-the-building vehicular passage ways.

13) What streets were included in the modelling of projected CO levels for the site?

14) The appropriateness of using standards developed for healthy adults in a hospital zone should be addressed.

Noise

Noise Assessment Method

p. VI-69

15) Both short and long term impacts from construction noise and vibration should be evaluated in light of the special concerns of a hospital zone. Will vibrations from construction affect sensitive medical equipment and how will this be monitored? Inside noise levels are based upon the assumption that windows will be closed. Is this realistic? Other qualities besides loudness should be assessed. Pure-tone or rhythmic noise may be a particular nuisance to in-patients. Measures to minimize impacts should be directed specifically toward patients as well as general source controls.

p. VI-78

16) Many techniques and procedures which "can" be used to minimize construction noise impacts are presented. Although a commitment is made to minimize noise impacts, there is no commitment to the degree of attenuation that will be required of the contractors, other than meeting the proposed standards of the Boston Air Pollution Control Commission. These standards do not address the impacts of in-patients and staff at the Hospital. Also no commitment is made to the choiced way of the suggested noise attenuation techniques.

Implementation

p. VI-81 17) It would seem appropriate to use specific contract provisions to guarantee that specified maximum noise levels are not exceeded.

Solid Waste

Construction

p. VI-83 18) Placing the responsibility for the disposal of solid waste from construction with the contractor does not eliminate impacts which should be considered.

Measures to Minimize Harm

p. VI-87 19) It would seem to be appropriate for the hospital to make a maximum commitment to recycling. In any event, a plan should be prepared for the contingency that Boston will be unable to accommodate the need for future solid waste disposal. Besides increased recycling, an on site incinerator designed to meet future air quality standards might be investigated.

Aesthetic Impacts

Scale and Massing

p. VI-91 20) The goal of making the Bulfinch Courtyard "a historic open space intended for rest and passive recreation uses" is laudable. However, from the descriptions of impacts due to the building mass of the project and the associated shadows and wind patterns, it is unclear how this goal will be attained.

VII Design and Performance Criteria to Minimize Harm

Vehicular Circulation

p. VII-18 21) What is "the so-called 'XT' Building in the Context Plan (Scheme B1)"?

Parking

p. VII-29 22) The shortage of adequate parking is an obvious problem and is likely to become worse. Dependence upon pro-

posals almost certain to meet resistance, such as the redevelopment of Suffolk County Jail as a parking structure or of areas adjacent to City Square in Charlestown, seems unrealistic. Assessing the "worst possible" condition would again appear to be useful. What local demands for parking are not being accommodated by new development projects?

Truck Service

p. VII-33 23) It is unclear where the subsurface tunnel in Scheme C-2 is to be located.

## RESPONSES TO THE SECRETARY

## EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS

### I. METHOD

#### 1. Minimum Stress Environment

(6) There will be little additional construction going on in the vicinity of the Massachusetts General Hospital during the time the Ambulatory Care Center will be constructed. The MEEI, now under construction, will be substantially complete before the ACC is begun. There are no plans yet for the Suffolk Jail, to be closed in 1976. The ongoing Charles River Park apartment and garage construction will be completed before the ACC begins. There are no definite plans yet for parcel 4B adjacent to the hospital. Although planning is under way for this area, it is unlikely that planning and design will be completed in time for the construction schedules of these two projects to overlap.

The only projects which are likely to be under construction at the same time as the ACC is the redevelopment of parcel 4A for housing and the Blackstone Housing for the Elderly. The garage on parcel 4A is now used for MGH parking. An application with the MHFA for financing is in the final stages of review, and CSCDC, the applicant, hopes to begin construction by August, 1975 and be finished by December, 1976. However, the 4A development would probably not have a significant environmental impact, since it is entirely renovation of a small existing structure. Demolition for the Blackstone Housing for the Elderly is expected to be under way by September, 1975 and be completed by early spring of 1977. This is a modular construction project and much of the air and noise effects will occur off site. If demolition on the ACC begins in June, 1976, then it will overlap 6 months with 4A and 9 months with Blackstone. Given the nature of the two projects, it is unlikely that they will have cumulative effects which would effect patients. The most likely cumulative impacts

are on transportation during construction, which is addressed below under I.4.

(11) Means to minimize demolition and construction dust are discussed on page VI-60. No acute pulmonary in-patients face the proposed site; instead, they are housed in Gray in a carefully controlled environment. Patients under intensive care are in windowless, air conditioned rooms. No other patients would be affected by dust generated during demolition and construction.

(12) No CO measurements were done for the site. However, the measurements at Science Park, which were used to establish background conditions at MGH, are perfectly adequate for this purpose since the wind generally blows across the Charles River from Science Park to MGH. The data on background conditions is provided in Table VI-20, page VI-64.

Total CO levels expected at the time of completion can be obtained from Table VI-22, page VI-66. However, these totals are misleading. Recent EPA projections of air quality in the vicinity indicate that it is improving. In addition, CO emissions will continue to decline as the age mix of vehicles becomes newer. Thus a sum of current background conditions and projected CO levels overstate future conditions.

The contribution of vehicles using on-site parking facilities is considered in the analysis. These garages are used throughout the day and there is not a significant queuing problem.

Air pollution problems associated with a through-the-building passageway are discussed on pages VI-106 through VI-111. Conclusions regarding the possible air quality impacts can only be made tentatively at this time since they depend very much on the exact height of the ACC, its exact distance from the Clinics Building, and the size of the passageway, if one is built. A wind tunnel analysis must be done to test different building designs, and the MGH is committed to performing this test.

(14) Even if the air quality standards set for a healthy adult are inadequate for a hospital patient, it is unlikely that more appropriate standards would be as low as the projected CO emission levels. Projected emissions do not approach the existing standards. The highest projection is 5.7 PPM for a one-hour concentration (standard is 35 PPM) and 3.9 PPM for an eight-hour average (standard is 8 PPM). Patients who are unable to tolerate these environmental conditions are treated as in-patients in a room environment which is controlled for air pollution, noise, and dust.

(15) The medical equipment used for patient diagnosis and treatment is actually rather sturdy. No diagnostic or treatment procedures would be affected unless the vibrations were so strong that the patient were actually vibrating, and this seems very unlikely. Research procedures would be interrupted only if the vibrations were sufficient to cause laboratory counters and trays to move. There were no reported problems of vibration during the recent construction of the Cox Building.

Much of the MGH is air conditioned and there is no need for a patient to open the window unless he wants to. Open or closed windows will have little impact on noise experienced by patients because hospitals are themselves very noisy places. The noise most irritating to patients, according to a recent U.S. Environmental Protection Agency report,* is conversation in the hallways. Critically ill patients whose recovery could be jeopardized by loud noises, pure tone, or rhythmic noise would be those under intensive care. However, in these rooms, the environment is sufficiently controlled to shut out all extraneous noise. If construction noise were to become a nuisance to

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*

some other patients, they could be moved to another part of the hospital. During the recent construction of the Cox Building, there was no need to do this.

(16) The hospital is committed to maintaining the quietest possible environment for its patients and staff and will adhere to the proposed Boston Air and Noise Pollution Control Commission standards of 75 dBA at the lot line of the nearest residential structure. This will benefit patients and staff, as well as nearby residents, because the nearest residence is as close to the proposed ACC as any other medical building.

As indicated on page VII-8, the methods used to achieve the noise standards will be chosen by MGH, CSCDC, and the contractor after the building has been designed. The control methods listed on page VI-79 are complementary and all could be used simultaneously. If a slurry trench foundation (which eliminates pile driving) can be incorporated into the design of the building, it will be used. Hospital commitment to specific methods of noise control before the building is designed would be premature and could mean that the most effective techniques might not be chosen. (See response to II, <u>Measures to Minimize Harm</u>.)

(17) Specific contract provisions will be used to guarantee that maximum noise levels are not exceeded.

2. <u>ACC Visit Projections</u>

It is difficult to project the use of any new medical facility. Given this uncertainty, the estimates of ACC usage (2,650 patients per day in 1980) have been based on the <u>maximum</u> number of patients (ten) a doctor can see in a single day at the MGH. (See page III-15 of the EIR.) These estimates, which represent a "worst case" situation, assume a continuation of doctor's research and teaching activities. They are corroborated by visitation estimates for the Lahey Clinic and Affiliated Hospitals - the two facilities which are most like the MGH. (See page III-16 of the EIR.)

They are generally not corroborated by out-patient visit estimates based on data for other hospitals which are not like the MGH in that they are not referral, teaching, or research hospitals. The data below show the range of estimates one could develop for the ACC, based on a variety of assumptions regarding doctor's activities.

| Data Source and Method | Assumptions | Visit Range for ACC |
|---|---|---|
| MGH now | Present patterns of research and teaching | 795 |
| MGH MD, full time | Full day of rounds and office visits, no teaching | 1,855-1,950 |
| MGH group practice | Maximum office visits per day, no rounds or teaching | 2,915-3,975 |
| MGH clinics history | Growth rate projected to all 1980 visits | 2,319 |
| National Hospital averages | No research or teaching | 3,307-4,320 |
| Affiliated Hospitals, San Francisco | Research and teaching | 2,282 |
| Affiliated Hospitals, Boston | Research and teaching for MD's but not for nurse practitioners | 2,263 |
| American Medical Association Medical Economics | No research or teaching; all MD's are full time | 5,406-5,883 |
| American Medical Association Medical Economics | Estimates adjusted to reflect number of MGH beds, teaching and research | 2,480 |

In sum, there is no basis for defining a "range" around the projected figure of 2,650 visits per day. It is a "worst case" estimate, given current assumptions about MGH, and any range would necessarily violate these assumptions or be an arbitrary "plus or minus" some percent.

Another approach to estimating ACC visits is to use population trend data for Boston and historical visitation growth rates for MGH and to project this growth for some future year, e.g., 1985. It is always uncertain exactly when some level of growth might be achieved, but it is probably safe to say that it will be achieved within 5 years

(plus or minus) of the forecasted year, e.g., 1980-1990. This approach is developed below.

Population projections published by the University of Massachusetts and used by the Department of Public Health for health planning show City of Boston and Metropolitan Boston populations declining between 1980 and 1985, and increasing very slightly between 1985 and 1990. Metropolitan Boston population is expected to decrease from 731,722 in 1980 to 718,945 in 1985. A slight increase to 724,289 is projected for 1990. Projections made by Dr. Alex Gans for the Boston Redevelopment Authority show City of Boston population increasing only slightly at a rate of less than 1 percent per year. The Department of Public Health has assumed, for health planning purposes, that Boston's population will be about the same in 1985 as it is in 1975.

Despite these factors, it is possible that ambulatory care will grow at the ACC, at some rate and under some extreme conditions. Vastly increased demand for ambulatory care could cause doctors to depend more on nurses and nurse practitioners, in order to handle more patients. The MGH could increase the number of patients that come from outside the Boston area. A shortage of research money might enable doctors to spend more time seeing patients. More doctors could be hired. A different relationship between the MGH and the Harvard Medical School could decrease doctors' teaching requirements. Changes of this type are viewed as very unlikely by the MGH because they are contrary to long-standing hospital policies.

Nevertheless, if these or other major changes in the delivery of patient care at MGH were to cause ambulatory care to grow at, for example, the historical rate of growth (4.3 percent per year), ambulatory patients could number 3,277 by 1985, as shown below.

MGH Daily Ambulatory Care Visits, 1980-1985

| | |
|---|---|
| 1980 | 2,650 |
| 1981 | 2,763 |
| 1982 | 2,888 |
| 1983 | 3,012 |
| 1984 | 3,142 |
| 1985 | 3,277 |

Given hospital policy, it seems more likely that growth will be slowed, and that this level of patient visitation will not occur until closer to 1990. However, if this growth were to occur sooner, then the environmental impacts associated with use of the ACC would be greater. These impacts include transportation, air quality, utilities, water quality, and solid waste.

Of all these impacts, transportation is the most significant. However, since ambulatory patient visits are such a small percentage of the activity at the MGH, these additional traffic impacts would be minimal. An increase in the number of ambulatory patients from 2,650 to 3,277 would, with accompanying visitors, increase the total 1980 ACC population from 4,825 to 5,571. This increases the total campus population to 14,935 or 1,259 more than the 1980 no-build projection.

This increased visitation would increase the total number of cars on campus 4,571 under the 1980 no-build assumptions to 4,985 with the ACC. This represents an increase of 414 cars over the 1980 no-build projection. This increase would have little effect on peak traffic flow since it would be spread throughout the day and distributed over many streets. The peak hour level of service on the streets in the area would not be changed over the 1980 no-build assumptions. As indicated in the EIR, traffic conditions would be comparable to the conditions that exist today.

However, if the present mode split and patient visit time continues, these 414 cars will need additional parking spaces. Instead of the 114 spaces identified in the EIR, the higher 1985 visit estimates show a need for 158 parking spaces. The hospital and the CSCDC are beginning to develop the recommendations in the EIR for improving parking.

3. Visual and Traffic Impacts on Charles River Park

Construction of the ACC would impact views from 5 to 10 percent of the apartments in the two towers presently under construction. These towers, located at 80 and 100 Staniford Street, are about one half mile from the site and are each 364 feet high. Views from these towers west-southwest to Longfellow Bridge and the ECA billboard in Cambridge are already blocked from the first to the ninth stories by existing buildings. Clear views of the Boston banks of the river are blocked through the thirteenth story. Construction of the ACC would block the view of the Longfellow Bridge and ECA billboard for an additional 5 stories from the tenth to the fourteenth floors of the towers. Clear views of the Boston banks of the Charles River would be blocked for an additional 10 floors.

Views of Charles River Basin, the Esplanade, and Beacon Hill are now blocked from the first to the fourteenth stories by the Charles River Park Office Building, the Holiday Inn, and the proposed Blackstone Housing for the Elderly. Construction of the ACC would not change these views. The most attractive views, which are the view of the Charles River Basin, Boston University, MIT, Esplanade (see Figure VI-16 on page VI-94), would not be effected at all by construction of the ACC.

The traffic impact on Charles River Park would not be significant under any of the "build" schemes for the ACC. The Charles River Park-related roadway most likely to be affected in Blossom Street which provides access to some of the development's parking areas.

The existing average daily traffic volume on Blossom Street is 7,000 cars. Under the Certificate of Need scheme, which keeps ACC-bound traffic oriented to North Grove Street, the 1980 volume on Blossom rises to only 7,700. Under the Parkman Cul-de-Sac Scheme, which reorients Parkman Garage and ACC traffic to Blossom and Parkman Streets to relieve North Grove Street, Blossom Street volume goes up

to 13,200. Inasmuch as Blossom Street has a capacity of 28,000 vehicles per day and is presently underutilized, the additional traffic represents only a small increase in the volume/capacity ratio from its present .25 to about .48. This ratio is still well below the level of congestion or serious interference for traffic moving to or from Charles River Park. (Streets that <u>do</u> suffer from congestion (Cambridge, North Grove, and Charles) by way of contrast, have volume/capacity ratios of about .75.)

Most affected would be the Blossom-Cambridge Street intersection, which would benefit from a left-turn-only signal period for Cambridge Street traffic. (A green left-turn arrow exists in the signal head, but has not been programmed to provide a left turn-lead.)

4. <u>Cumulative Construction Impact</u>

The construction traffic impacts of both the Blackstone and ACC, during the time that building will be ongoing on both projects, will be minimal. The traffic volumes and patterns on Blossom Street will not be significantly impacted since the capacity is great relative to the existing traffic volumes. Based on observation of the construction of the MGH Cox Building, the Blackstone apartment construction would probably usurp the parking lane of Blossom Street and occasionally one of the two moving lanes. Blossom Street's low traffic volumes should keep these lane closures from becomming a problem. Also, the ACC construction traffic has an alternative route via North Grove Street, and a second possible alternative on North Anderson with one-way reversal. Use of these routes could help ameliorate any problems of congestion or mutual interference of construction teams appearing on Blossom Street.

## II. MEASURES TO MINIMIZE HARM

### 1. Commitment to Minimizing Harm

The measures to minimize harm are expressed as environmental performance criteria in Chapter VII of the EIR. These criteria are standards against which to evaluate the design of the project. They represent a minimum level of design acceptability from an environmental point of view.

The important advantage of establishing environmental performance criteria is that they commit the project planners and architects to protecting the environment early in the planning process before the design for the project has been finalized and modifications become difficult. Performance criteria enable the project architects and planners to develop the solutions that best satisfy the criteria without compromising other considerations. Although the EIR provides examples of how the criteria could be met (slurry wall excavation, underground tunnel, sky bridge, etc.) it is not intended that these examples be rigidly followed if better methods can be found.

The environmental performance criteria will be considered along with all of the other planning criteria, including space requirements, proximity, and the like. As the design progresses, the MGH and CSCDC will be reviewing it for its adherence to all of these criteria - both planning and environmental.

## III. ALTERNATIVES

### 1. Contingency Plans

(9) There are no plans at present to increase the capacity of the West Side Interceptor. However, extension of the Boston Marginal Conduit to a chlorination-detention pumping station will provide a considerable improvement in current levels of pollution in Boston Harbor. The Department of Public Works has stated that there is sufficient

capacity to accomodate sewage from the proposed ACC. (See Letters from the Community, appended to the EIR.)

(19) At the present time, the City of Boston is negotiating a solution to its solid waste problem. The incinerator must be shut down on July 1, 1975, because of air pollution violations. The city landfill in West Roxbury will be usable for only 2 to 3 more years. Clearly, the city must make a commitment now for future solid waste disposal.

The most hazardous wastes generated by MGH - pathological and radiological - are handled separately from the rest of the hospital's solid waste. Any disruption of city services would not endanger public health by exposure to these materials.

MGH is committed to a program of recycling, and cardboard and scrap metal are already being recycled. A comprehensive report on recycling by the hospital's industrial engineer is currently under review by the hospital administration. If the report is approved, the hospital will expand its recycling program.

In the event that the City of Boston is unable to solve its solid waste disposal problem, the hospital could negotiate for rights to use a private landfill or build a new incinerator. Previous MGH experience with incineration proved unsatisfactory because of the high moisture content of the wastes and failures in the incineration equipment. Thus, it is more likely that the hospital would choose to locate a private landfill for disposing of its wastes directly.

(22) As indicated above, under the worst possible conditions (1985 projections occuring by 1980) the ACC would create a demand for 158 additional parking spaces over the 1980 no-build condition. The draft EIR and subsequent memoranda presented by both the study team and the CSCDC's architect have addressed the problem of finding additional parking spaces in an area already experiencing shortages. The importance of reducing parking demand through car pooling and transit

incentives has likewise been addressed. This information can be found on pages VII-29 through VII-32.

This parking need has to be examined in relation to the existing deficit of 515 parking spaces. Lacking any increase in supply, the deficit is projected to increase to 533 in 1980 without the ACC. With the ACC, the deficit rises to 691 if the extreme "worst case" projections are used.

To offset the existing and future deficit there are a number of short-range and long-range approaches and improvements that can be adopted by MGH.

The short range strategies include:

- Stricter police enforcement to reduce illegal parking
- Administrative changes to re-price MGH parking nearer its current market value to reduce demand and offer incentive for car pooling or a shift to transit usage.
- Administrative measures to prevent mid-day shifting of cars from Nashua Street to the MGH
- Sponsorship of the MBTA Pre-Paid Pass program in-house
- Carpool matching program and incentives set up for employees
- Designation of the Parkman Street Garage as exclusively for ACC patient and other short-term parkers if the ACC is built
- Sponsorship of a "van pool" program
- Utilization and possible subsidization of existing commercial parking and some under construction, e.g., Charles River Park (including 1200 new spaces under construction), Kenmore Square parking garage
- Utilization of existing parking space by MGH on a lease basis, e.g., Museum of Science lots north of the Charles River

- Extension of shuttle bus routes to serve remote parking areas and possibly some transit stops, e.g., North Station, Bowdoin, Science Park.

Long-range strategies and ones more costly or difficult to implement include:

- Establishment of MGH-owned or -leased lots on vacant land near City Square and/or Sullivan Square, Charlestown
- Construction of MGH parking garages on its Nashua Street property and/or the Suffolk County Jail site should it become available
- Use of Bunker Hill Community College commerical "fringe parking" facility - a commercial facility now in planning - with shuttle service provided
- Use of commercial lot space behind North Station and the Madison Hotel.

Out of this listing, a program of strategies can be shaped that will be effective in counteracting MGH-generated parking deficit, both existing and future, including that generated by the ACC.

## IV. CONCLUSIONS

Questions concerning construction impacts such as noise, dust, and traffic, operational impacts such as aesthetics, energy usage, sewage generation, traffic and parking structure, air pollution impacts, and solid waste impacts have been addressed in the draft and final EIR and in these responses.

## RESPONSES TO THE

## CHARLES RIVER PARK TEN TAXPAYERS GROUP

### I. ADEQUACY OF THE CRAFT ENVIRONMENTAL IMPACT REPORT

#### Visit Projections

See responses to comment number I.2. of the Secretary of Environmental Affairs for additional information on visit projections.

#### Tenants for Charles River Park

Doctors, like commercial tenants, plan their moves somewhat in advance. Thus, it does not seem unreasonable that, with sufficient advertising, CRP will be able to locate new medical tenants for the space vacated by 25 doctors, given several years in which to do it. It is obviously not necessary for new tenants to sign leases four years in advance. Minor renovations to the space may be required, but the new tenants may prefer to undertake these as leasehold improvements.

#### Cumulative Impacts

Visual and traffic impacts on Charles River Park are discussed further in the response to comment I.3. of the Secretary of Environmental Affairs. Cumulative construction impacts are discussed in the same group of responses under number I.4.

#### Traffic Impacts

Traffic impacts are discussed further in the responses to comment I.2. of the Secretary of Environmental Affairs. Parking alternatives are presented in response III, ALTERNATIVES, to the Secretary of Environmental Affairs, as well as in Chapter VII of the EIR.

#### Cost of the ACC

No claim is made in the EIR that only 4 percent of the total cost of the ACC will be for labor.

### II. ECONOMIC VIABILITY VS. INCREASED IMPACTS

The increase in the cost of rent will not substantially affect the

cost per patient's visit or the number of visits to a doctor. The average private MGH physician now occupies 105 square feet of office space and pays $10 per square foot for rent. In the new ACC, he would occupy 640 square feet and pay $12 per square foot. In the present case the annual rent is $1,050, and in the ACC case the rent would be $7,680, with a difference of $6,630. Given an average patient visit cost of $25, this additional rent will require an additional 265 visits per doctor per year, or approximately one per day. The ACC visit projections made in the draft report assume that the doctors will be efficient enough in the new building to see at least one more patient per day. Thus, it will not be necessary to increase the number of patients further in order to alleviate a supposed rent burden. (See also, comment (5), Institute for Man and Environment.)

## III. CONDITIONAL APPROVALS

A discussion of the concept of environmental performance criteria and their application to this project can be found in the responses to the Secretary of Environmental Affairs, II, MEASURES TO MINIMIZE HARM. The projected $25,000,000 cost of the ACC will not increase because it is not permitted to under the Certificate of Need Program.

## IV. PROJECTED IMPACTS ON CHARLES RIVER PARK

### Aesthetic and Parking Impacts

Aesthetic and parking impacts on Charles River Park are discussed under the responses to the Secretary of Environmental Affairs, I.3.

### Zoning

The requirement for a zoning variance is not certain, and the reasons for this are described in detail in pages VI-11 through VI-13. Even if a zoning variance were required, it would be for such a small increment of space that no precedent for further expansion would be established.

## RESPONSES TO THE

## BEACON HILL CIVIC ASSOCIATION

### I. VISIT PROJECTIONS

Alternative visit projections, including a projection to 1985, are provided in the responses to the Secretary of Environmental Affairs, comment I.2.

### II. TRAFFIC AND PARKING

The Beacon Hill Civic Association is correct in stating that there is no reason to delay efforts to reduce parking congestion. The CSCDC and the MGH are reviewing the parking recommendations made in the EIR and supplementary memoranda and are planning an implementation strategy. However, the parking problem is largely an existing one and therefore it would not be appropriate for the Department of Public Health to make approval of the ACC contingent on its resolution.

### III. BULFINCH BUILDING

At present, the Bulfinch Building can only be seen on axis with dome and portico from about 300 feet away. With the Certificate of Need Alternative, that distance increases to approximately 380 feet. In either the no-build or the Certificate of Need case, the Bulfinch dome is visible slightly off axis along North Anderson Street. With construction of the ACC, and removal of the temporary buildings, all of the dome and portico will be visible from Anderson Street. (See Figure VI-15A, on page VI-89.)

The point is well made that the ACC will affect the Bulfinch Building and courtyard more than the existing MGH "permanent buildings. However, the "temporary" buildings could not be removed unless the ACC or some other large building were built.

To a pedestrian, the ACC will appear large, although it would be no larger than most of the other MGH buildings.

However, it is precisely its height and mass which will provide the architect with the opportunity of creating a backdrop for the Bulfinch Building. The specific elevation treatment will have to harmonize with existing elevations, yet allow the Bulfinch to stand out by contrasting materials and scale.

## IV. RELOCATION

Some of the 27,626 square feet of space in Moseley and Walcott that will be eliminated now serve those buildings and will not be needed when the buildings are torn down. This includes the maintenance shop, public space (foyer), and mechanical equipment. The hospital is eliminating its undergraduate nurses training program as of 1978. The nurses who were housed in Wolcott will live in Bartlett or at 20 Charles Street. A few graduate nurses will continue to be trained, but they have not lived on campus in the past. The meeting room used by the nurses will not be needed when this program is phased out.

The use of space made available by the Ambulatory Care Center was detailed in the Certificate of Need application and is repeated here in order that it be part of the final environmental report as well. (See p. D-18)

The Warren Building Offices were originally developed for use by the pathology department and other service and research laboratories. However, the space has been used temporarily (since 1956) for staff offices. With new Ambulatory Care Center housing for these physicians, this space will revert to its original purpose to service the badly overcrowded pathology department and other lab facilities.

The Clinics Building first floor will be used to house expanded needs of walk-in patients. The basement and second floor will permanently house administrative functions displaced by the demolition of the Moseley and Walcott Buildings.

The Baker 11 Surgical Facility will be used to house either the Burns Unit or Dialysis Unit which are presently located on White 12 in

contiguous quarters. As the Burns and Dialysis Units must be separated, the Baker 11 space could be utilized to achieve this end. The patients in the Burns Unit are most often highly infectious and it is essential that patients on the Renal Dialysis Ward remain free of infection. The JCAH (Joint Committee on Accreditation of Hospitals) has declared the contiguity to be dangerous and has specified that the situation should be rectified as soon as possible.

The table on the following page details the use of this space.

## USE OF SPACE VACATED BY CONSTRUCTION OF ACC

### Physicians' Offices

A. Warren 7 - 11

1. Two floors to Pathology
2. Options for other three:
   a. Offices & labs (from Temp. I, II, Moseley & Walcott)
   b. House staff on-call rooms
   c. Patient care
   d. Combination of above

B. Clinics Building

1. Clinics Basement (½ of floor Business & Administrative Offices, Clinics Pharmacy and Orthopedics)

   Employee Lockers (from Moseley Basement (Temp. II))
2. Clinics 1 - All walk-in services
3. Clinics 2 - Personnel
4. Clinics 3 - Pediatrics remains (½ of floor)
   Social Service (½ of floor)

C. Other Offices on Main Campus

1. Gray 7 - new Medical Service Practice offices
2. White 4 & 5 - Surgical Association
3. Gray 5 - Orthopedics Group
4. White 10 - Urology
5. White-Gray 11 - Neurology-Neurosurgery
6. Kennedy 9 - Neurology
7. Vincent 1 - Gynecology
8. Vincent 1/Basement - Pediatrics
9. Tilton 2 - Psychiatry Group Practice

### Medical Support Services

A. Radiology

Baker 1. Functionally rearrange Radiology Department to concentrate radiologic support services that are allied with the Cox Cancer Management Building.

B. Labs

Performance of tests will remain in centralized laboratories. Collection of specimens and spot testing will be decentralized to ACC.

C. Ambulatory Surgery

Baker 11 - to Dialysis Unit (Burns Unit to retain all of White 12).

## V. MASTER PLAN

The hospital does not have any plans for demolition or construction in the immediate vicinity of the ACC. Specifically, the Clinics Building, despite its advanced age, is intended to house expanded needs of walk-in patients and administrative functions, as described above. Further environmental studies will clearly be required if the hospital decides to build a new facility on this site.

## VI. OTHER QUESTIONS

The specific tax payment for the building is yet to be worked out. However, it is obvious that the new building will increase city revenue with little or no increase in city costs.

The water distribution system on the north side of Cambridge Street is unrelated to the distribution network on Beacon Hill. Therefore, the ACC will not affect the water pressure on Beacon Hill.

The MGH is presently attempting to locate additional off-campus parking to replace the Cambridge Street Garage and supplement the overcrowded garages and the Nashua Street lot. This strategy, plus others to reduce parking demand, will all have to be considered in detail to solve the local parking problems.

## RESPONSES TO THE INSTITUTE FOR MAN AND THE ENVIRONMENT

### ADDITIONAL COMMENTS

(4) The use of calcium chloride to reduce dust during demolition and construction decreases the amount of water required. It would have no effect on storm and sanitary sewers because of the low concentration which would reach the sewers and its low corrosivity. However, this compound is toxic to plants and would have to be used with care adjacent to the Bulfinch Courtyard. Other binding agents which could be used in place of calcium chloride are heavy oil and various commercial preparations. Heavy oil would create sewage disposal problems and is therefore not commonly used or recommended here. The use of other commercial preparations should be investigated by the contractor.

(5) MGH Clinic visit costs are comparable to the visit costs for group practices in the Boston area. See also, the response to Comment II, Charles River Park Ten Taxpayers Group, page D-14.

(6) See response to the Secretary of Environmental Affairs, page D-1.

(7) When this building is removed, the courtyard will be used for passive recreation. There is no permanent building contemplated for this site.

(8) There will be no "critical equipment" in use in the ACC. The operating suites in the White Building are fully equipped with standby generators to provide electricity automatically in case of a power failure.

(9) See response to the Secretary of Environmental Affairs, p. D-10.

(10) During excavation of the ACC site, the removed earth will be hauled promptly from the site. This will help minimize runoff, as well as dust. The use of a binding chemical such as calcium chloride or other chemical preparations will decrease the amount of wetting solution needed to control dust and therefore reduce the potential for runoff.

(11) See response to the Secretary of Environmental Affairs, p. D-2.

(12) See response to the Secretary of Environmental Affairs, p. D-2.

(13) See Table VI-20, page VI-64, of the EIR.

(14) See response to the Secretary of Environmental Affairs, p. D-3.

(15) See response to the Secretary of Environmental Affairs, p. D-3.

(16) See response to the Secretary of Environmental Affairs, p. D-4.

(17) See response to the Secretary of Environmental Affairs, p. D-4.

(18) Most of the construction debris, which is cardboard, will be recycled in the MGH recycling facility.

(19) See response to the Secretary of Environmental Affairs, p. D-11.

(20) See response to the Beacon Hill Civic Association, III, Bulfinch Building, p. D-16.

(21) The Context Plan for the MGH called for a new medical building to be located on the corner of Parkman and Blossom Streets. The hospital no longer feels that this building will be necessary and has eliminated it from the plan.

(22) See response to the Secretary of Environmental Affairs, p. D-11.

(23) The location of the tunnel is shown on page VII-17 of the EIR.

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